

## FILE INDEX

**Applicant :** Pleasants Energy, LLC      **Plant ID No.:** 073-00022      **Region** 2  
**Facility :** Waverly Facility      **R14-** 0034

Chronological Order - Add Index Pages As Necessary

Date	To	From	Subject
09-18-15	Beverly McKeone	Gerald M. Gatti	Permit Application and Cover Letter
09-21-15	Gerald Gatti	Sandra Adkins	Application Status Email
09-22-15	Beverly McKeone	Mary Hauner Davis	Electronic Copies of Application
09-22-15	Steve Pursley	Beth Ward	Application Fee Receipt
10-06-15	Beverly McKeone	Gerald Gatti	Affidavit of Publication
10-12-15	Gerald Gatti	Steven Pursley	Application Status: Incomplete
10-19-15	Beverly McKeone	Gerald Gatti	Affidavit of Publication for Corrected Ad
10-21-15	Steven Pursley	Mary Hauner Davis	Conf. Call Appt.
10-21-15	Adam Birbeck	Melanie Pitrolo	Q/d Calculations
01-08-16	Adam Birbeck	Mary Hauner Davis	Class I Visibility Modeling
01-11-16	Jon McClung	Mary Hauner Davis	Class I Increment Modeling
02-01-16	Mary Hauner Davis	Claire O'Dea	USFS Comments on Modeling Protocol
03-02-16	Holly Salazar	Mary Hauner Davis	Class I Visibility and Deposition Report
03-02-16	Jon McClung	Gerald Gatti	Class I Visibility and Increment Report
04-14-16	Mary Hauner Davis	Claire O'Dea	Response to Modeling Reports
04-21-16	Mary Hauner Davis	Claire O'Dea	Response to Modeling Reports
07-05-16	Gerald Gatti	Steven Pursley	Application Status: Complete
07-12-16	Paul Wentworth	Steven Pursley	Copy of PSD Application
07-14-16	Steven Pursley	Adam Birbeck	Response to Question
08-22-16	Steve Pursley	Gerald Gatti	Revised BACT Analysis
09-01-16	Steve Pursley	Gerald Gatti	GHG BACT Additional Information
09-22-16	Steve Pursley	Jon McClung	Modeling Memo
10-20-16	Jon D. McClung	Emily Robbins	Revised Modeling
10-25-16	Steve Pursley	Beverly McKeone	Go to Notice
11-04-16	Steve Pursley	Gerald Gatti	Revised BACT Limits
12-16-16	Steve Pursley	Jon McClung	Supplemental Modeling Review Memo
12-20-16	<i>St. Marys Oracle</i>	Sandra Adkins	Publication of Class I Legal Ad
12-20-16	Jacob Glance	Sandra Adkins	DAQ Public Notice
12-20-16	Paul Wentworth	Sandra Adkins	Required EPA Notification
12-20-16	Andrew Hall	Steven Pursley	Required Ohio Notification

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Date	To	From	Subject
12-20-16	Andrew Hall	Steven Pursley	Required County Notification
12-20-16	Paul Wentworth	Steven Pursley	Modeling Memos
12-20-16	Andrea Stacy	Steven Pursley	Required FLM Notification

SRP  
12/20/2016

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**Permit / Application Information Sheet**  
**Division of Environmental Protection**  
**West Virginia Office of Air Quality**

<b>Company:</b>	Pleasants Energy, LLC	<b>Facility:</b>	Waverly
<b>Region:</b>	2	<b>Plant ID:</b>	073-00022
<b>Application #:</b>	R14-0034		
<b>Engineer:</b>	Pursley, Steve	<b>Category:</b>	Power Plt
<b>Physical Address:</b>	adjacent to Rt 2, 1 mi E of Pleasants County Willow Island WV 26170	<b>SIC:</b> [4911] ELECTRIC, GAS AND SANITARY SERVICES - ELECTRIC SERVICES <b>NAICS:</b> [221112] Fossil Fuel Electric Power Generation	
<b>County:</b>	Pleasants		
<b>Other Parties:</b>	PLT_MGR - Gatti, Gerald 304-665-4201 Contact - Birbeck, Bruce 713-636-1133 Contact - Hauner-Davis, Mary 816-822-4252		

**Information Needed for Database and AIRS**

No required information is missing.

**Regulated Pollutants**

**Summary from this Permit R14-0034**

Air Programs		Applicable Regulations
Fee Program	Fee	Application Type
	\$11,000.00	CONSTRUCTION

**Notes from Database**

**Activity Dates**

APPLICATION RECIEVED	09/18/2015
APPLICATION FEE PAID	09/21/2015
ASSIGNED DATE	09/21/2015

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Please note, this information sheet is not a substitute for file research and is limited to data entered into the AIRTRAX database.

Company ID: 073-00022  
Company: Pleasants Energy, LLC  
Printed: 09/21/2015  
Engineer: Pursley, Steve

NON-CONFIDENTIAL

09/21/2015

## Pursley, Steven R

**From:** Pursley, Steven R  
**Sent:** Tuesday, December 20, 2016 4:40 PM  
**To:** 'Stacy, Andrea'  
**Cc:** Kessler, Joseph R; 'cbodea@fs.fed.us'  
**Subject:** RE: Pleasants Energy Preliminary Determination and Notice  
**Attachments:** dper1.pdf; notice.pdf; preliminary determination.pdf; Pleasants\_Energy\_MEMO\_with\_attachments.pdf; Pleasants\_R14\_0034\_Supplemental\_Modeling\_Memo\_12\_16\_16.pdf

Andrea and Clair,

WVDAQ has finished its preliminary review of the Pleasants Energy, LLC project and per your request (way back in April), attached is the DRAFT permit, Preliminary Determination (which includes the BACT analysis) and public notice. The public notice will publish in the *St. Marys Leader* on Wednesday December 20, 2016.

I've also attached the modeling reports prepared by Jon McClung of WVDAQ.

Please let me know if you have any questions.

Steve

073-00024

COMPANY	FILE: Pleasants Energy
FACILITY	Hauner 1-7
REGION	2 REG. 14-0034

**From:** Stacy, Andrea [mailto:andrea\_stacy@nps.gov]  
**Sent:** Thursday, April 21, 2016 1:54 PM  
**To:** O'Dea, Claire B -FS <cbodea@fs.fed.us>  
**Cc:** Hauner-Davis, Mary <mhauner@burnsmcd.com>; jalyn\_cummings@nps.gov; McClung, Jon D <Jon.D.McClung@wv.gov>; susan\_johnson@nps.gov; Kessler, Joseph R <Joseph.R.Kessler@wv.gov>; Pursley, Steven R <Steven.R.Pursley@wv.gov>; John\_Notar@nps.gov; Pitrolo, Melanie -FS <mpitrolo@fs.fed.us>; Anderson, Bret A -FS <baanderson02@fs.fed.us>; Salazer, Holly <holly\_salazer@nps.gov>; Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda <mnelson@burnsmcd.com>  
**Subject:** Re: Pleasants Energy Class I Visibility and Deposition Modeling Report

Hi Mary,

The NPS concurs with the USFS determination, we do not anticipate any significant additional impacts to AQRVs in Shenandoah NP as a result of this facility. We want to echo Claire's thanks for your responsiveness to our requests and concerns.

Although we will not be providing further comment with regard to the AQRV impacts or analyses, for record keeping purposes, we would appreciate it if WV DEP could submit a copy of the draft permit and associated BACT and staff analyses when these become available.

Thank you again involving the NPS in this permit determination. Please feel free to contact me if you have additional questions.

Regards,  
Andrea Stacy

On Thu, Apr 14, 2016 at 3:15 PM, O'Dea, Claire B -FS <[cbodea@fs.fed.us](mailto:cbodea@fs.fed.us)> wrote:



## Pursley, Steven R

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**From:** Pursley, Steven R  
**Sent:** Tuesday, December 20, 2016 12:15 PM  
**To:** 'wentworth.paul@epa.gov'  
**Subject:** RE: WV Draft Permit R14-0034 for Pleasants Energy, LLC; Waverly Power Plant  
**Attachments:** Pleasants\_R14\_0034\_Supplemental\_Modeling\_Memo\_12\_16\_16.pdf;  
Pleasants\_Energy\_MEMO\_with\_attachments.pdf

Paul,

The Preliminary Determination Sandra sent you does not have Attachment A (the modeling reports). Please see the attached documents for those. Note that there are two. The "supplemental" memo explains why.

Thanks.

Steve

073-00022

FILE:	
COMPANY	Pleasants Energy
FACILITY	Waverly
REGION	2
REG.	14-0034

**From:** Adkins, Sandra K  
**Sent:** Tuesday, December 20, 2016 10:03 AM  
**To:** 'wentworth.paul@epa.gov' <wentworth.paul@epa.gov>; 'bradley.megan@epa.gov' <bradley.megan@epa.gov>; gerald.gatti@na.engie.com; adam.birbeck@gdfsuezna.com  
**Cc:** Durham, William F <William.F.Durham@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; McCumbers, Carrie <Carrie.McCumbers@wv.gov>; Hammonds, Stephanie E <Stephanie.E.Hammonds@wv.gov>; Pursley, Steven R <Steven.R.Pursley@wv.gov>; Taylor, Danielle R <Danielle.R.Taylor@wv.gov>; Rowe, Michael T <Michael.T.Rowe@wv.gov>; Rice, Jennifer L <Jennifer.L.Rice@wv.gov>  
**Subject:** WV Draft Permit R14-0034 for Pleasants Energy, LLC; Waverly Power Plant

Please find attached the Draft Permit R14-0034, Preliminary Determination/Fact Sheet, and Public Notice for Pleasants Energy, LLC's Waverly Power Plant.

The notice will be published in the *St. Marys Oracle* on Wednesday, December 21, 2016, and the thirty day comment period will end on Friday, January 20, 2017.

Should you have any questions or comments, please contact the permit writer, Steve Pursley, at 304 926-0499 x1218.

## Pursley, Steven R

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**From:** Pursley, Steven R  
**Sent:** Tuesday, December 20, 2016 12:09 PM  
**To:** 'smorgan\_clerk@yahoo.com'  
**Cc:** Kessler, Joseph R  
**Subject:** Public Notice for Pleasants Energy, LLC  
**Attachments:** notice.pdf

073-00022

FILE	
COMPANY	Pleasant Energy
FACILITY	Waukegan
REGION	2
REG.	14-0034

Ms. Morgan

With this email, the Secretary of the WV Department of Environmental Protection is providing you a copy of the attached Class I legal advertisement that will run in the St. Marys Oracle on Wednesday December 21, 2016. Said copy fulfills the requirement under 45CSR§14-17.5 of the WV code to "send a copy of the advertisement to... the chief executives of the city and county where the source would be located "

If you have any questions or comments, please do not hesitate to contact me.

Thank You

Steven R. Pursley, PE  
(304)926-0499 x. 1218  
Steven.r.pursley@wv.gov

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## Pursley, Steven R

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**From:** Pursley, Steven R  
**Sent:** Tuesday, December 20, 2016 11:56 AM  
**To:** 'andrew.hall@epa.ohio.gov'  
**Cc:** Kessler, Joseph R  
**Subject:** Public Notice for Pleasants Energy, LLC  
**Attachments:** notice.pdf

673-00022

FILE:	
COMPANY	Pleasant Energy
FACILITY	Waverly
	2 REG. 14-0021

Mr. Hall

With this email, the Secretary of the WV Department of Environmental Protection is providing you a copy of the attached Class I legal advertisement that will run in the St. Marys Oracle on Wednesday December 21, 2016. Said copy fulfills the requirement under 45CSR§14-17.5 of the WV code to "send a copy of the advertisement to...any other State or local air pollution control agencies...and...any state...whose lands may be affected by emissions from the source or modification."

If you have any questions or comments, please do not hesitate to contact me.

Thank You

Steven R. Pursley, PE  
(304) 926-0499 x. 1218  
[Steven.r.pursley@wv.gov](mailto:Steven.r.pursley@wv.gov)

NON-CONFIDENTIAL

## Pursley, Steven R

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**From:** Adkins, Sandra K  
**Sent:** Tuesday, December 20, 2016 10:03 AM  
**To:** 'wentworth.paul@epa.gov'; 'bradley.megan@epa.gov'; gerald.gatti@na.engie.com; adam.birbeck@gdfsuezna.com  
**Cc:** Durham, William F; McKeone, Beverly D; McCumbers, Carrie; Hammonds, Stephanie E; Pursley, Steven R; Taylor, Danielle R; Rowe, Michael T; Rice, Jennifer L  
**Subject:** WV Draft Permit R14-0034 for Pleasants Energy, LLC; Waverly Power Plant  
**Attachments:** 14-0034.pdf; predetermination14-0034.pdf; notice.pdf

Please find attached the Draft Permit R14-0034, Preliminary Determination/Fact Sheet, and Public Notice for Pleasants Energy, LLC's Waverly Power Plant.

The notice will be published in the *St. Marys Oracle* on Wednesday, December 21, 2016, and the thirty day comment period will end on Friday, January 20, 2017.

Should you have any questions or comments, please contact the permit writer, Steve Pursley, at 304 926-0499 x1218.

073-00022

FILE:	
COMPANY	Pleasant Energy
FACILITY	Waverly
REG.	14-0034

NON-CONFIDENTIAL

**From:** Adkins, Sandra K  
**Sent:** Tuesday, December 20, 2016 10:02 AM  
**To:** Glance, Jacob P; Gillenwater, Kelley J  
**Cc:** Pursley, Steven R  
**Subject:** DAQ Public Notice

Please see below the Public Notice for Draft Permit R14-0034 for Pleasants Energy, LLC's Waverly Power Plant located in Pleasants County.

The notice will be published in *The St. Marys Oracle* on Wednesday, December 21, 2016, and the thirty day public comment period will end on Friday, January 20, 2017.

## AIR QUALITY PERMIT NOTICE

### Notice of Intent to Approve

073-00022

FILE:	
COMPANY	Pleasants Energy
FACILITY	Waverly
REGION	2
REG.	14-0034

On September 18, 2015, Pleasants Energy, LLC applied to the WV Department of Environmental Protection, Division of Air Quality (DAQ) for a permit to modify a natural gas fired electric peaking facility located along State Route 2, near Waverly but in Pleasants County, WV at latitude 39.3330 and longitude -81.3636. A preliminary evaluation has determined that all State and Federal air quality requirements will be met by the proposed facility. The DAQ is providing notice to the public of its preliminary determination to issue the permit as R14-0034.

The following potential emissions will be authorized by this permit action: Particulate Matter less than 10 microns, 103.6 tons per year (TPY); Particulate Matter, 103.6 TPY; Sulfur Dioxide, 39.2 TPY; Oxides of Nitrogen, 510.0 TPY; Carbon Monoxide, 549.7 TPY; Volatile Organic Compounds, 29.8 TPY; H<sub>2</sub>SO<sub>4</sub>, 6.0 TPY; Lead, 0.01 TPY; Total HAPs, 12.9 TPY; Greenhouse Gases (CO<sub>2e</sub> basis) 1,263,362 TPY.

The West Virginia Department of Environmental Protection and USEPA regulations require that all pollutants that will be increased "significantly" (as defined within 45CSR14) from a proposed modification of a major source be controlled by "best available control technology" (as defined within 45CSR14), that emissions of all regulated air pollutants shall not cause or contribute to violations of either the primary or secondary national air quality standards (NAAQS) nor any Class 1 or Class 2 air quality increments applicable in the area where the source is to be located, or elsewhere; and the pollutant emissions from the proposed source must not adversely impact upon soils, vegetation, and visibility in the vicinity of the proposed plant site. A preliminary evaluation by the WV DAQ of the information submitted by Pleasants Energy, LLC indicates that the proposed construction will meet all applicable state and federal air quality requirements including those stated above. Based upon this finding, the WV DAQ has made a preliminary determination to approve the application and issue permit R14-0034 for the construction and operation of the facility.

The following are the results of the ambient air quality modeling analysis:

**Class 1 Analysis:** The Class 1 analysis produced the following results: The modeling analysis indicated that the project should not have any noticeable effect on visibility nor have any adverse impacts resulting from deposition. Additionally, the modeling showed that even at a distance of 50 km (31 miles) most impacts were below the Class I Significant Impact Levels (SILs) and all impacts were below the SILs at the actual Class I areas.

**Class 2 Analysis:** The modeling indicated that only the 1 hour standard for NO<sub>2</sub> and 24 hour standard for PM<sub>2.5</sub> were "significant" thereby requiring the applicant to proceed to the next stage of the modeling process for those pollutants. This stage showed that, although the maximum modeled concentration in the form of the standard for each scenario exceeds the NAAQS, Pleasants Energy, LLC's contribution is less than the Significant Impact Limit (SIL) paired in time and space.

Written comments or requests for a public meeting must be received by the DAQ before 5:00 p.m. on Friday, January 20, 2017. A public meeting may be held if the Director of the DAQ determines that significant public interest has been expressed, in writing, or when the Director deems it appropriate.

The purpose of the DAQ's permitting process is to make a preliminary determination if the proposed modification will meet all State and Federal air quality requirements. The purpose of the public review process is to accept public comments on air quality issues relevant to this determination. Only written comments received at the address noted below within the specified time frame, or comments presented orally at a scheduled public meeting, will be considered prior to final action on the permit. All such comments will become part of the public record.

Steven R. Pursley, PE  
WV Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304  
Telephone: 304/926-0499, ext. 1218  
FAX: 304/926-0478

Additional information, including copies of the draft permit, application and all other supporting materials relevant to the permit decision may be obtained by contacting the engineer listed above. The draft permit and engineering evaluation can be downloaded at:

[www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx](http://www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx)

Copies of all documents, including the PSD application and required attachments thereto, WVDAQ analyses and other documents used in the Directors evaluation of the company's application and a copy of the preliminary determination and draft permit prepared by the WVDAQ are available for public review at the addresses listed above this paragraph between the hours of 8:00 am and 5:00 pm Monday through Friday, holidays excluded.

## Pursley, Steven R

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**From:** Adkins, Sandra K  
**Sent:** Tuesday, December 20, 2016 9:00 AM  
**To:** 'advertising@oracleandleader.com'  
**Cc:** Pursley, Steven R  
**Subject:** Publication of Class I Legal Ad for the WV Division of Air Quality

Please publish the information below as a Class I legal advertisement (one time only) in the Wednesday, December 21 2016, issue of *The St. Marys Oracle*. Please let me know that this has been received and will be published as requested. Thank you.

Send the invoice for payment and affidavit of publication to:

**Sandra Adkins**

**WV Department of Environmental Protection  
DIVISION OF AIR QUALITY**

**601- 57th Street**

**Charleston, WV 25304**

073-00021

FILE:	
COMPANY	Pleasant Energy
FACILITY	Waverly
REGION	2
REG.	14-0034

## AIR QUALITY PERMIT NOTICE

### Notice of Intent to Approve

On September 18, 2015, Pleasants Energy, LLC applied to the WV Department of Environmental Protection, Division of Air Quality (DAQ) for a permit to modify a natural gas fired electric peaking facility located along State Route 2, near Waverly but in Pleasants County, WV at latitude 39.3330 and longitude -81.3636. A preliminary evaluation has determined that all State and Federal air quality requirements will be met by the proposed facility. The DAQ is providing notice to the public of its preliminary determination to issue the permit as R14-0034.

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The West Virginia Department of Environmental Protection and USEPA regulations require that all pollutants that will be increased "significantly" (as defined within 45CSR14) from a proposed modification of a major source be controlled by "best available control technology" (as defined within 45CSR14), that emissions of all regulated air pollutants shall not cause or contribute to violations of either the primary or secondary national air quality standards (NAAQS) nor any Class 1 or Class 2 air quality increments applicable in the area where the source is to be located, or elsewhere; and the pollutant emissions from the proposed source must not adversely impact upon soils, vegetation, and visibility in the vicinity of the proposed plant site. A preliminary evaluation by the WV DAQ of the information submitted by Pleasants Energy, LLC indicates that the proposed construction will meet all applicable state and federal air quality requirements including those stated above. Based upon this finding, the WV DAQ has made a preliminary determination to approve the application and issue permit R14-0034 for the construction and operation of the facility.



The following are the results of the ambient air quality modeling analysis:

**Class 1 Analysis:** The Class 1 analysis produced the following results: The modeling analysis indicated that the project should not have any noticeable effect on visibility nor have any adverse impacts resulting from deposition. Additionally, the modeling showed that even at a distance of 50 km (31 miles) most impacts were below the Class I Significant Impact Levels (SILs) and all impacts were below the SILs at the actual Class I areas.

**Class 2 Analysis:** The modeling indicated that only the 1 hour standard for NO<sub>2</sub> and 24 hour standard for PM<sub>2.5</sub> were "significant" thereby requiring the applicant to proceed to the next stage of the modeling process for those pollutants. This stage showed that, although the maximum modeled concentration in the form of the standard for each scenario exceeds the NAAQS, Pleasants Energy, LLC's contribution is less than the Significant Impact Limit (SIL) paired in time and space.

Written comments or requests for a public meeting must be received by the DAQ before 5:00 p.m. on Friday, January 20, 2017. A public meeting may be held if the Director of the DAQ determines that significant public interest has been expressed, in writing, or when the Director deems it appropriate.

The purpose of the DAQ's permitting process is to make a preliminary determination if the proposed modification will meet all State and Federal air quality requirements. The purpose of the public review process is to accept public comments on air quality issues relevant to this determination. Only written comments received at the address noted below within the specified time frame, or comments presented orally at a scheduled public meeting, will be considered prior to final action on the permit. All such comments will become part of the public record.

Steven R. Pursley, PE  
WV Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304  
Telephone: 304/926-0499, ext. 1218  
FAX: 304/926-0478

Additional information, including copies of the draft permit, application and all other supporting materials relevant to the permit decision may be obtained by contacting the engineer listed above. The draft permit and engineering evaluation can be downloaded at:

[www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx](http://www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx)

Copies of all documents, including the PSD application and required attachments thereto, WVDAQ analyses and other documents used in the Directors evaluation of the company's application and a copy of the preliminary determination and draft permit prepared by the WVDAQ are available for public review at the addresses listed above this paragraph between the hours of 8:00 am and 5:00 pm Monday through Friday, holidays excluded.



**Pursley, Steven R**

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**From:** McClung, Jon D  
**Sent:** Friday, December 16, 2016 3:32 PM  
**To:** Pursley, Steven R  
**Cc:** Crowder, Laura M; McKeone, Beverly D; Andrews, Edward S; Kessler, Joseph R; Qutaish, Fadi  
**Subject:** Pleasants R14-0034 Supplemental Analysis Modeling Memo  
**Attachments:** Pleasants\_R14\_0034\_Supplemental\_Modeling\_Memo\_12\_16\_16.pdf

Steve,

Attached is my review memorandum for the supplemental air quality dispersion modeling analysis for the blackstart operating scenario.

Regards,  
Jon.

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Jonathan D. McClung, P.E.  
West Virginia DEP  
Division of Air Quality  
601 57<sup>th</sup> Street SE  
Charleston WV 25304  
(304) 926-0499 ext. 1689  
Jon.D.McClung@wv.gov

023-00022

FILE:	
COMPANY	Pleasant Energy
FACILITY	hwy
REGION	2
REG.	14-0034

NON-CONFIDENTIAL



November 4, 2016

Steve Pursley  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304

073-00022

FILE:	
COMPANY	Pleasants Energy
FACILITY	Wardly
REGION	2 REG. 14-0034

Re: Additional Information Regarding NOx and CO2 BACT Rates for Pleasants Energy, LLC Air Permit Application

Dear Mr. Pursley:

Pleasants Energy, LLC (Pleasants Energy) submitted a Prevention of Significant Deterioration Air Permit Application for increased hours of operation of the simple-cycle combustion turbines at the Pleasants Energy facility in September 2015. Pleasants Energy is submitting additional information related to the greenhouse gas and NOx Best Available Control Technology (BACT) analysis for your review to support the BACT analysis.

Upon review of the NOx BACT limits, Pleasants is requesting a pound per hour (lb/hr) BACT limit for NOx while operating on fuel oil, in lieu of a ppm limit. The prior synthetic minor air permit for Pleasants included only lb/hr permit limits as opposed to ppm limits and Pleasants is very familiar with reporting and determining compliance with the lb/hr limit. Further, the combustion turbines are tuned to achieve the NOx limit for natural gas operation (primary fuel), but are not capable of being tuned in emergency situations when they might need to operate fuel oil. For this reason, Pleasants is requesting a fuel oil BACT limit of 350 lb/hr for NOx emissions on a 30-day average, excluding startup and shutdown, to support fuel oil use during testing and in emergencies. EPA's RACT/BACT/LAER clearinghouse (RBLC) database was reviewed and the RBLC simple-cycle combustion turbine results while operating on fuel oil are attached in Attachment A. The database shows that lb/hr BACT limits were provided for several units while operating on fuel oil for emergency use. Pleasants requests to keep the proposed BACT limit while operating on natural gas at 9 ppm at 15% O<sub>2</sub> on a 30-day average.

Pleasants also requests updated greenhouse gas BACT emissions limits. The submitted PSD air permit application requested one BACT limit for all fuels. The air permit will have separate emission limits for gas operation and fuel oil operation. Pleasants has reviewed available data and is proposing two greenhouse gas emission limitations: one for gas and one for fuel oil operation. Pleasants proposes a BACT limit for greenhouse gas emissions while operating on natural gas to 1,300 lb CO<sub>2</sub>/gross MW-hr on an annual basis. While combusting fuel oil, Pleasants proposes a limit of 1,900 lb CO<sub>2</sub>/gross MW-hr on an annual basis.

Pleasants Energy LLC  
10319 South Pleasants Highway  
St. Marys, WV 26170  
Phone: 304-665-4200  
Fax: 304-665-4218

Entire Document  
NON-CONFIDENTIAL



If WV DEP requires more information on this Project or the BACT analysis, please feel free to contact either of the persons listed below:

Bruce Birbeck  
Engie  
1990 Post Oak Blvd, Suite 1900  
Houston, TX 77056  
Phone: 713-636-1133  
[Adam.Birbeck@na.engie.com](mailto:Adam.Birbeck@na.engie.com)

Mary Hauner-Davis  
Burns & McDonnell  
9400 Ward Parkway  
Kansas City, MO 64114  
Phone: 816-822-4252  
[mhauner@burnsmcd.com](mailto:mhauner@burnsmcd.com)

Thank you for your time and efforts on our Project.

Sincerely,

A handwritten signature in black ink, appearing to read "Gerald Gatti".

Gerald Gatti  
Plant Manager

Attachments

cc: Don Stacey, GDF Suez  
Bruce Birbeck, GDF Suez  
Mary Hauner-Davis, Burns & McDonnell

RBLCID	Permit Date	Facility Name	Corporation	State	Through put	Units	Control Device	Emission Limit 1	Units	Type
FL-0319	3/10/2009	GREENLAND ENERGY CENTER	JACKSONVILLE ELECTRIC AUTHORITY (JEA)	FL	30213	GAL/YR	Water injection system when firing fuel oil.	329.4	LB/H	BACT- PSD
MD-0043	7/1/2014	PERRYMAN GENERATING STATION	CONSTELLATION POWER SOURCE GENERATION, INC.	MD	120	MW	WATER/STEAM INJECTION, AND A	5	PPMVD @ 15% O2	LAER
OH-0253	3/7/2006	DAYTON POWER AND LIGHT COMPANY	DAYTON POWER AND LIGHT COMPANY	OH	1115	MMBTU/H	WATER INJECTION	195	LB/H	BACT- PSD
OH-0253	3/7/2006	DAYTON POWER AND LIGHT COMPANY	DAYTON POWER AND LIGHT COMPANY	OH	1115	MMBTU/H	WATER INJECTION	195	LB/H	BACT- PSD
OH-0333	12/3/2009	DAYTON POWER & LIGHT ENERGY LLC	DAYTON POWER & LIGHT COMPANY	OH	4216	H/YR	Water injection	269	LB/H	BACT- PSD
OK-0120	3/22/2007	PSO RIVERSIDE JENKS POWER STA	PUBLIC SERVICE CO OF OKLAHOMA	OK			DRY-LOW NOX BURNERS	9	PPMVD	BACT- PSD
TX-0506	4/19/2006	NRG TEXAS ELECTRIC POWER GENERATION	NRG TEXAS	TX	80	mw	SCR AND LOW NOX BURNERS	364.5	LB/H	BACT- PSD
TX-0506	4/19/2006	NRG TEXAS ELECTRIC POWER GENERATION	NRG TEXAS	TX	80	MW	LOW NOX BURNERS AND SCR	320	LB/H	BACT- PSD
TX-0794	4/7/2016	HILL COUNTY GENERATING FACILITY	BRAZOS ELECTRIC COOPERATIVE	TX	171	MW	DLN, WATER INJECTION	42	PPMVD @ 15% O2	BACT- PSD
WI-0240	1/26/2006	WE ENERGIES CONCORD	WISCONSIN ELECTRIC POWER	WI	100	mw	WATER INJECTION	65	PPMVD @ 15% O2	BACT- PSD

# INTERNAL PERMITTING DOCUMENT TRACKING MANIFEST

Company Name Pleasant Energy

Permitting Action Number BK4-0034

Total Days 377

DAQ Days 164

## Permitting Action:

- ☐ Permit Determination
- ☐ General Permit
- ☐ Administrative Update

- ☐ Temporary
- ☐ Relocation
- ☐ Construction

- ☐ Modification
- ☒ PSD (Rule 14)
- ☐ NNSR (Rule 19)

## Documents Attached:

- ☒ Engineering Evaluation/Memo
- ☒ Draft Permit
- ☒ Notice
- ☐ Denial
- ☐ Final Permit/General Permit Registration

- ☐ Completed Database Sheet
- ☐ Withdrawal
- ☐ Letter
- ☐ Other (specify) \_\_\_\_\_

Date	From	To	Action Requested
9-29-16	Steven Pursley	Ber	Please Review
10/25	Ber	Stone	Go to Notice

Entire Document  
NOT CONFIDENTIAL

NOTE: Retain a copy of this manifest for your records when transmitting your document(s).

# AIR QUALITY PERMIT NOTICE

## Notice of Intent to Approve

On September 18 2015, Pleasants Energy, LLC applied to the WV Department of Environmental Protection, Division of Air Quality (DAQ) for a permit to modify a natural gas fired electric peaking facility located along State Route 2, near Waverly but in Pleasants County, WV at latitude 39.3330 and longitude -81.3636. A preliminary evaluation has determined that all State and Federal air quality requirements will be met by the proposed facility. The DAQ is providing notice to the public of its preliminary determination to issue the permit as R14-0034.

The following potential emissions will be authorized by this permit action: Particulate Matter less than 10 microns, 103.6 tons per year (TPY); Particulate Matter, 103.6 TPY; Sulfur Dioxide, 39.2 TPY; Oxides of Nitrogen, 510.0 TPY; Carbon Monoxide, 549.7 TPY; Volatile Organic Compounds, 29.8 TPY; H<sub>2</sub>SO<sub>4</sub>, 6.0 TPY; Lead, 0.01 TPY; Total HAPs, 12.9 TPY; Greenhouse Gases (CO<sub>2e</sub> basis) 1,263,362 TPY.

The West Virginia Department of Environmental Protection and USEPA regulations require that all pollutants that will be increased "significantly" (as defined within 45CSR14) from a proposed modification of a major source be controlled by "best available control technology" (as defined within 45CSR14), that emissions of all regulated air pollutants shall not cause or contribute to violations of either the primary or secondary national air quality standards (NAAQS) nor any Class 1 or Class 2 air quality increments applicable in the area where the source is to be located, or elsewhere; and the pollutant emissions from the proposed source must not adversely impact upon soils, vegetation, and visibility in the vicinity of the proposed plant site. A preliminary evaluation by the WV DAQ of the information submitted by Pleasants Energy, LLC indicates that the proposed construction will meet all applicable state and federal air quality requirements including those stated above. Based upon this finding, the WV DAQ has made a preliminary determination to approve the application and issue permit R14-0034 for the construction and operation of the facility.

The following are the results of the ambient air quality modeling analysis:

**Class 1 Analysis:** The Class 1 analysis produced the following results: The modeling analysis indicated that the project should not have any noticeable effect on visibility nor have any adverse impacts resulting from deposition. Additionally, the modeling showed that even at a distance of 50 km (31 miles) most impacts were below the Class I Significant Impact Levels (SILs) and all impacts were below the SILs at the actual Class I areas.

**Class 2 Analysis:** The modeling indicated that only the 1 hour standard for NO<sub>2</sub> and 24 hour standard for PM<sub>2.5</sub> were "significant" thereby requiring the applicant to proceed to the next stage of the modeling process for those pollutants. This stage showed that, although the maximum modeled concentration in the form of the standard for each scenario exceeds the NAAQS, Pleasants Energy, LLC's contribution is less than the Significant Impact Limit (SIL) paired in time and space.

Written comments or requests for a public meeting must be received by the DAQ before 5:00 p.m. on **DRAFT**. A public meeting may be held if the Director of the DAQ determines that significant public interest has been expressed, in writing, or when the Director deems it appropriate.

The purpose of the DAQ's permitting process is to make a preliminary determination if the proposed modification will meet all State and Federal air quality requirements. The purpose of the public review process is to accept public comments on air quality issues relevant to this determination.

Only written comments received at the address noted below within the specified time frame, or comments presented orally at a scheduled public meeting, will be considered prior to final action on the permit. All such comments will become part of the public record.

Steven R. Pursley, PE  
WV Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304  
Telephone: 304/926-0499, ext. 1218  
FAX: 304/926-0478

Additional information, including copies of the draft permit, application and all other supporting materials relevant to the permit decision may be obtained by contacting the engineer listed above. The draft permit and engineering evaluation can be downloaded at:

[www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx](http://www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx)

Copies of all documents, including the PSD application and required attachments thereto, WVDAQ analyses and other documents used in the Directors evaluation of the company's application and a copy of the preliminary determination and draft permit prepared by the WVDAQ are available for public review at the addresses listed above this paragraph between the hours of 8:00 am and 5:00 pm Monday through Friday, holidays excluded.



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**west virginia** department of environmental protection

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Division of Air Quality  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304  
Phone: (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

*Pursuant to §45-14-17.2*

## **PRELIMINARY DETERMINATION/FACT SHEET**

*for the*

**Construction**

*of*

**Pleasants Energy, LLC's  
Waverly Power Plant**

*located in*

**Waverly, Pleasants County, WV.**

---

**Permit Number: R14-0034  
Facility Identification Number: 073-00022**

**Date: July 5, 2016**

*9/29/16*



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## **BACKGROUND INFORMATION**

Application No.: R14-0034  
Plant ID No.: 073-00022  
Applicant: Pleasants Energy, LLC  
Facility Name: Waverly Power Plant  
Location: Pleasants County  
NAICS Code: 221112  
Application Type: PSD Major Construction  
Received Date: September 18, 2015  
Engineer Assigned: Steven R. Pursley, PE  
Fee Amount: \$11,000  
Date Received: September 21, 2015  
Complete Date: April 18, 2016  
Due Date: October 14, 2016  
Applicant Ad Date: September 26, 2015  
Newspaper: *Pleasants County Leader*  
UTM's: Easting: 468.63 km Northing: 4,353.57 km Zone: 17

On November 29, 1999 Pleasants Energy, LLC submitted a permit application to construct a 300 MW, natural gas fired, simple cycle peaking power facility near Waverly, WV (Pleasants County). The plant included two General Electric (GE) 7FA class simple cycle combustion turbines, each nominally rated at 167.8 MW (while firing natural gas at an ambient temperature of 59° F and 60% relative humidity) including generator, exciter, and associated auxiliary mechanical and electrical systems. The primary fuel was natural gas, and low sulfur distillate fuel oil was to be the backup fuel. The electrical output tied directly into the Allegheny Power transmission system which is located on the property.

The original 1999 application proposed limiting emissions from the facility to less than 250 tons per year of each criteria pollutant in order to avoid constructing a "major" source per 45CSR14 and thereby undergoing PSD review procedures. The resulting permit (R13-2373) limited annual criteria pollutant emissions to the following:

Pollutant	TPY
Oxides of Nitrogen	241
Sulfur Dioxide	53
PM-10	75
Volatile Organic Compounds	12
Carbon Monoxide	116

The permit made those limits practically enforceable primarily by limiting the amount of fuel which could be consumed by the turbines and requiring Pleasants Energy to install and operate a Continuous Emissions Monitoring System (CEMS) for NO<sub>x</sub>. Construction of the facility was completed and the plant began operating in 2001.

On September 18, 2015, Pleasants Energy submitted an application to modify the facility. Specifically, Pleasants wishes to increase the permitted amount of fuel which can be combusted by the facility. This modification results in emissions from the facility increasing over the major source threshold of 250 tons per year of both NO<sub>x</sub> and CO. Per 40 CFR 52.21(r)(4);

*"At such time that a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements or paragraphs (j) through (s) of this section shall apply to the source or modification as though construction had not yet commenced on the source or modification."*

Therefore, the application submitted by Pleasants Energy on September 18, 2015, will be subject to all requirements of PSD review.

Emission sources associated with the permit are:

- \* Two General Electric (GE) Model 7FA simple cycle combustion turbines (CTs).

The potential emissions of Carbon Monoxide (CO), and Oxides of Nitrogen (NO<sub>x</sub>), are above the "major source" thresholds that require the application to be reviewed under the Prevention of Significant Deterioration (PSD) program administered in WV under 45CSR14. Emissions of PM, PM<sub>10</sub> and PM<sub>2.5</sub> are less than PSD major source thresholds but above PSD significance thresholds. Therefore they will also be reviewed under the PSD program. The emission rates of VOC's, Sulfur Dioxide (SO<sub>2</sub>), Lead (Pb) and Sulfuric Acid Mist (H<sub>2</sub>SO<sub>4</sub>) are below the "significance" threshold and, therefore, the application will also be concurrently reviewed under the WV minor source program administered under 45CSR13.

The following document will outline the DAQ's preliminary determination that the construction of the Pleasants Energy, LLC facility will meet the emission limitations and conditions set forth in the DRAFT permit and will comply with all current applicable state and federal air quality rules and standards.

## **PUBLIC REVIEW PROCEDURES**

Public review procedures for a new major construction application dual-reviewed under 45CSR13 and 45CSR14 require action items at the time of application submission and at the time a draft permit is prepared by the DAQ. The following details compliance with the statutory and accepted procedures for public notification with respect to permit application R14-0034.

### ***Actions Taken at Application Submission***

Pursuant to §45-13-8.3 and §45-14-17.1, Pleasants Energy, LLC placed a Class I legal advertisement in the following newspaper on the specified date notifying the public of the submission of a permit application:

- *The Pleasants County Leader* (September 26, 2015)

A link to the electronic copy of the application was sent to the following organizations:

- The U.S Environmental Protection Agency - Region 3 (July 12, 2016)
- The National Park Service (October 7, 2015)

- The US Forest Service (October 7, 2015)

The application was also available at the DAQ Headquarters in Charleston (Kanawha City) for review.

### ***Actions Taken at Completion of Preliminary Determination***

Pursuant to §45-13-8.5 and §45-14-17.4, upon completion (and approval) of the preliminary determination and draft permit, a Class 1 legal advertisement will be placed in the following newspapers stating the DAQ's preliminary determination regarding R14-0034:

- *The Pleasants County Leader*

A copy of the preliminary determination and draft permit shall be forwarded to EPA Region 3. Pursuant to §45-13-8.7, copies of the application, complete file, preliminary determination and draft permit shall be available for public review during the public comment period at the WVDEP Headquarters in Charleston. Further, the U.S. Forest Service and the National Park Service will receive copies of the preliminary determination and draft permit upon request. All other requests by interested parties for information relating to permit application R14-0034 shall be provided upon request. Additionally, the preliminary determination and draft permit will be posted on WVDAQ's webpage.

A public meeting to accept written and oral comments concerning the preliminary determination and draft permit may take place on a date to be determined at the time the public notice is published (at the Directors discretion).

### ***Actions Taken at Completion of Final Determination***

Pursuant to §45-14-17.7, and 17.8 upon reaching a final determination concerning R14-0034, the DAQ shall make such determination available for review at WVDEP Headquarters in Charleston.

## **DESCRIPTION OF PROPOSED FACILITY**

Pleasants Energy plans to increase the hours of operation of its two simple-cycle GE-7FA combustion turbines at the Pleasants Energy facility located near Waverly, West Virginia. The facility is located in Pleasants County, which is currently designated as attainment/unclassified for all criteria pollutants.

The existing Pleasants Energy facility is a 300 MW simple cycle electric generating peaking stations. The facility includes two GE 7FA simple cycle combustion turbines each rated at 167.8 MW (natural gas, 59°F, 60% humidity). The turbines primary fuel is natural gas but low sulfur distillate fuel oil is utilized as a backup fuel. In 2015, Pleasants equipped each turbine with a TurboPhase system that injects externally supplied air into the combustion turbine after compressor discharge at the inlet to the combustor. This increases air mass flow through the turbines and, consequently, generator output.

R14-0034  
Pleasants Energy, LLC  
Waverly Power Plant

In the event of a catastrophic blackout, the Pleasants facility can supply power to the grid which would provide the necessary power to allow other, larger, power plants to restart. To provide this capability, Pleasants Energy must be able to startup from "black start" conditions. Therefore, in 2014 Pleasants installed five (5) diesel-fired Caterpillar Model C175-16 4,376 brake-horsepower (bhp) reciprocating internal combustion engine (RICE) paired with a 3 MW generator. Pleasants existing permit limited each generator to 500 hours of operation per year. This limit will be retained in the PSD permit.

The facility also has a fuel oil storage tank on site which is considered de minimis per 45CSR13 Table 45-13B item 58.

Each combustion turbine has its own exhaust stack. Each stack is 114.5 feet above grade.

## **SITE INSPECTION**

On July 13, 2016 the writer conducted a site inspection of the location of the Pleasants Energy, LLC plant. The following observations were made during the inspection:

- The site of the plant is located less than one mile east of Waverly, WV but in Pleasants County, WV.
- The power generation facility lies just south of State Route 2. The plant is very close to other industrial and commercial facilities.
- The general topography of the area is a river valley (approximately 1 mile wide). Ground level of the site will be approximately 630 feet above sea level. The surrounding mountains rise to over 900 feet above sea level. Stack height will be approximately 180 feet above ground level.
- The following pictures were taken the day of the site inspection:



## **PROPOSED EMISSIONS**

The Pleasants Energy, LLC Plant will have the following potential-to-emit of the specified pollutants:

**Table 1: Facility-wide PTE**

Pollutant	tons/year <sup>(2)(3)</sup>
CO	549.70
NO <sub>x</sub>	510.00
PM	103.60
PM <sub>10</sub>	103.60
PM <sub>2.5</sub>	103.60
SO <sub>2</sub>	39.20
VOCs	29.80
H <sub>2</sub> SO <sub>4</sub>	6.00
Lead	0.01
CO <sub>2e</sub>	1,263,362.00
Total HAPs	12.90

- (1) Annual emissions are based on the scenario which gives the highest rate for each individual pollutant.  
(2) As determined by rolling 12-month totals.  
(3) Annual emissions include start up and shut down emissions.

## **EMISSIONS CALCULATION METHODOLOGIES**

The following section will detail the emission calculation methodologies used by Pleasants Energy, LLC to calculate the potential-to-emit of the facility.

### ***Combustion Turbines***

Emissions from the combustion turbines can be broken down into steady state operation emissions (with and without TurboPhase operations and firing natural gas or fuel oil) and startup/shutdown emissions.

#### **Steady State Operations**

Potential emissions of NO<sub>x</sub> and CO were based on BACT emission levels while SO<sub>2</sub>, VOC, sulfuric acid (H<sub>2</sub>SO<sub>4</sub>), lead and greenhouse gasses (GHGs) from the combustion turbines were based on vendor specifications provided by GE. PM, PM<sub>10</sub>, and PM<sub>2.5</sub> were based on stack testing of similar units.

Emissions from the F-Class combustion turbines are dependent on the ambient temperature conditions and the turbine's operating load, which can vary from 60 percent to 100 percent and 100 percent load with TurboPhase operation. To account for representative seasonal climatic variations, potential emissions from the proposed combustion turbines were analyzed at 60 and 100 percent load conditions as well as 100 percent load with TurboPhase for ambient temperatures ranging from negative (-)10 degrees Fahrenheit (°F) to 100 °F. Projected emissions were based on data provided by GE for the 7FA combustion turbine and information from the TurboPhase vendor, as well as AP-42 emission factors.

The permit will require testing/CEMs to confirm compliance with the emission rates.

**Table 2: Steady State Turbine Emission Factor Source** (natural gas operation/per turbine)

Pollutant	Emission Rate	Emission Factor Source	Comments
CO	9 ppm	BACT	32 lb/hr w/o TurboPhase (TP) 36 lb/hr w/ TurboPhase
NO <sub>x</sub>	9 ppm	BACT	65 lb/hr w/o TP 75 lb/hr w/ TP Includes Low NO <sub>x</sub> Burners
PM	15 lb/hr w/o TP 17.2 lb/hr w/ TP	Stack Testing on same model & generation of Turbines	Includes both filterable and condensable PM
PM <sub>10</sub>			
PM <sub>2.5</sub>			
SO <sub>2</sub>	2.5 lb/hr w/o TP 2.8 lb/hr w/ TP	Mass Balance	
VOCs	3.0 lb/hr w/o TP 3.4 lb/hr w/ TP	Manufacturer	
GHGs	183,771 lb/hr w/o TP 212,072 lb/hr w/ TP	AP-42 & 40 CFR 98 Subpart A	CO <sub>2e</sub> Basis
H <sub>2</sub> SO <sub>4</sub>	0.38 lb/hr w/o TP 0.44 lb/hr w/TP	Mass Balance	Assumes 10% of SO <sub>2</sub> & 100% of SO <sub>3</sub> is converted to H <sub>2</sub> SO <sub>4</sub>
HAPs	0.77 b/hr	AP-42	



**Table 3: Steady State Turbine Emission Factor Source** (fuel oil operation w/TP/per turbine)

Pollutant	Emission Rate	Emission Factor Source	Comments
CO	20 ppm	BACT	72 lb/hr
NO <sub>x</sub>	42 ppm	BACT	470 lb/hr
PM	39 lb/hr	Vendor Data	Includes both filterable and condensable PM
PM <sub>10</sub>			
PM <sub>2.5</sub>			
SO <sub>2</sub>	103 lb/hr	Mass Balance	
VOCs	8 lb/hr	Vendor Data	
GHGs	256,873	AP-42 & 40 CFR 98 Subpart A	CO <sub>2e</sub> Basis
H <sub>2</sub> SO <sub>4</sub>	15.8 lb/hr	Mass Balance	Assumes 10% of SO <sub>2</sub> & 100% of SO <sub>3</sub> is converted to H <sub>2</sub> SO <sub>4</sub>
HAPs	2.00	AP-42	

### Start-Up and Shut-Down Emissions

Each combustion turbine may start up to 365 times per year which may include up to 20 starts on fuel oil. For natural gas combustion, potential start-up and shut-down emissions were based on a start-up profile and conservatively assumed that there would be up to 365 cold start-ups and 365 shut-down events per turbine per year on natural gas. One start-up and shut-down event is equivalent to one start-up (0 percent load to when the turbine is in "Mode 6", which is approximately 60 percent load or minimum load for steady state operation and emissions compliance) plus one shut-down (60 percent load or minimum load for steady state operation and emissions compliance to 0 percent load). Start-up is assumed to take 120 minutes while shut-down shall take 60 minutes for a total of 180 minutes for one start-up and shut-down event.

Potential fuel oil start-up and shut-down emissions were based on a start-up profile and conservatively assumed that there would be 20 cold start-ups and 20 shut-down events per turbine per year on fuel oil. One fuel oil start-up and shut-down event is equivalent to one start-up (0 percent load to when the turbine is in "Mode 6", which is approximately 80 percent load or minimum load for steady state operation and emissions compliance) plus one shut-down (80 percent load or minimum load for steady state operation and emissions compliance to 0 percent load).

**Table 4: Start-Up & Shut-down Turbine Emissions** (natural gas operation/per turbine)

Pollutant	Start-Up Emission Rate (lb/hr)	Shut-Down Emission Rate (lb/hr)	Total Emissions Per Event (lbs)
CO	384.4	144.4	913.2
NO <sub>x</sub>	121.2	103.3	345.7
PM	18.0	18.0	54
PM <sub>10</sub>			
PM <sub>2.5</sub>			
SO <sub>2</sub>	2.50	2.50	7.5
VOCs	6.80	6.20	19.8
GHGs	183,771	183,771	551,313
H <sub>2</sub> SO <sub>4</sub>	0.38	0.38	1.14

**Table 5: Start-Up & Shut-down Turbine Emissions** (fuel oil operation/per turbine)

Pollutant	Start-Up Emission Rate (lb/hr)	Shut-Down Emission Rate (lb/hr)	Total Emissions Per Event (lbs)
CO	230.4	195.7	656.5
NO <sub>x</sub>	561.6	543.1	1,666.3
PM	39.0	39.0	117.0
PM <sub>10</sub>			
PM <sub>2.5</sub>			
SO <sub>2</sub>	103.0	103.0	309.0
VOCs	9.10	9.0	27.2
GHGs	255,995	255,995	767,985
Lead	0.02	0.02	0.06
H <sub>2</sub> SO <sub>4</sub>	15.8	15.8	47.4

Annual turbine emissions (two turbines combined) are based on the maximum of each pollutant under several different operating scenarios.

**Table 6: Maximum Annual Turbine Emissions:**

Pollutant	Annual Emission Rate (tpy)
CO	509.54
NO <sub>x</sub>	464.60
PM	100.10
PM <sub>10</sub>	
PM <sub>2.5</sub>	
SO <sub>2</sub>	39.03
VOCs	23.84
GHGs	1,231,632.52
Lead	0.01
H <sub>2</sub> SO <sub>4</sub>	6.02

The turbines are the only equipment being modified in this permitting action. However, as explained below under Regulatory Applicability, emissions from the rest of the facility must be examined to make sure that they should not also undergo PSD review.

### ***TurboPhase Engines***

Each of the two turbines is connected to TurboPhase system. Each TurboPhase system consists of four 2,750 hp spark ignition, natural gas fired engines. The TurboPhase system injects externally supplied air into the combustion turbine after compressor discharge at the inlet to the combustor.

Estimates of NO<sub>x</sub>, CO, PM, and VOC emissions from the TurboPhase engines are based on vendor data. SO<sub>2</sub> emissions are based on AP-42 Section 3.4. Greenhouse gasses are based on 40 CFR Part 98. Annual emissions are based on each engine operating 3,250 hours per year. This limitation is included in their existing permit and will be folded in to the new PSD permit.

**Table 7: Maximum TurboPhase Engine Emissions.**

Source	CO		NO <sub>x</sub>		VOCs		PM/PM <sub>10</sub> /PM <sub>2.5</sub>		SO <sub>2</sub>	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TP engines <sup>1</sup>	5.34	8.66	24.26	39.4	1.46	2.36	1.60	2.60	0.08	0.12

<sup>1</sup>Both TurboPhase systems (all 8 engines) combined.

## Blackstart Generators

The maximum potential-to-emit (PTE) from Pleasant Energy's emergency generators is summarized in the table below. Emissions were based on the applicable NSPS limits, (NO<sub>x</sub>, NMHC, CO and PM) and on factors obtained from AP-42, Section 3.4 (VOCs, SO<sub>2</sub> and HAPs). Fuel consumption was based on information provided by the vendor and a fuel heat content of 137,000 Btu/gal was used in the calculations. The existing permit limits the facility to 500 hours per year of operation per engine. The new permit will retain this limit.

**Table 8: Maximum Emergency Generator Emissions (Per Engine)**

Pollutant	Emission Factor	Source	Hourly (lb/hr)	Annual (ton/yr)
CO	2.61 g/bhp-hr	Subpart IIII	25.18	6.29
NO <sub>x</sub>	0.50 g/bhp-hr	Subpart IIII	4.82	1.21
NMHC	0.3 g/bhp-hr	Subpart IIII	2.89	0.73
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	0.07 g/bhp-hr	Subpart IIII	0.72	0.18
SO <sub>2</sub> <sup>(1)</sup>	0.0000121 lb/hp-hr	AP-42, Table 3.4-1	0.05	0.02
VOCs	0.000642 lb/hp-hr	AP-42, Table 3.4-1	2.88	0.72
Total HAPs	0.0045 lb/mmbtu <sup>(3)</sup>	AP-42, Table 3.4-3	0.13	0.04

(1) Based on 15 ppm sulfur

(2) Based on TOCs being 91% Non methane (see footnote f of table 3.4-1)

(3) Sum of all HAPs in AP-42 Tables 3.4-3 & 3.4-4

**Table 9: Maximum Emergency Generator Emissions (All five Engines combined)**

Pollutant	Hourly (lb/hr)	Annual (ton/yr)
CO	125.90	31.47
NO <sub>x</sub>	24.10	6.03
NMHC	14.39	3.60
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	3.60	0.90
SO <sub>2</sub> <sup>(1)</sup>	0.27	0.07
VOCs	14.39	3.60
Total HAPs	0.04	0.17

Emissions from the existing facility are taken directly from the engineering evaluation for R13-2373B.

**Table 10: Existing Emissions from the Facility**

Source <sup>1</sup>	CO	NO <sub>x</sub>	VOCs	PM/PM <sub>10</sub> /PM <sub>2.5</sub>	SO <sub>2</sub>
	tpy	tpy	tpy	tpy	tpy
Turbines	116.0	241.0	12.0	75.0	53.0
TP engines	8.66	39.4	2.36	2.60	0.12
Generators	31.47	6.03	3.60	0.90	0.07
<b>Total</b>	<b>156.13</b>	<b>286.43</b>	<b>17.96</b>	<b>78.5</b>	<b>53.19</b>

<sup>1</sup>Two turbines combined, 8 TurboPhase engines combined and 5 generators combined.

Comparing Table 10 and Table 1 give the increase in emissions due to this modification.

**Table 11: Increase in Emissions**

CO	NO <sub>x</sub>	VOCs	PM/PM <sub>10</sub> /PM <sub>2.5</sub>	SO <sub>2</sub>
tpy	tpy	tpy	tpy	tpy
393.57	223.57	11.84	25.1	-13.99

It should be noted that SO<sub>2</sub> emissions decrease because the existing permit contains an indirect fuel oil limit (it contains a direct natural gas limit which is reduced for each gallon of fuel oil used thus resulting in an indirect fuel oil limit) of 15,770,000 gallons per year. The new permit will contain an explicit fuel oil limit of 4,205,357 gallons per year (as per the permit application).

Total HAP emissions from the modified facility will be as shown in Table 12 (all emissions based on AP-42 except for natural gas formaldehyde emissions from the combustion turbines which are based on the 08/21/2001 Roy Sims EPA Memo). Emissions are based on the turbines burning the maximum permitted amount of natural gas because that scenario results in the highest total HAP emissions.

**Table 12: Facility Wide HAP Emissions**

Pollutant	Turbines		Generators		TurboPhase Engines		Total	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
2,2,4-Trimethylpentane	--	--	--	--	0.02	0.03	0.02	0.03
Acetaldehyde	0.13	0.39	--	--	0.57	0.92	0.70	1.31
Acrolein	0.02	0.06	--	--	0.35	0.57	0.37	0.63
Benzene	0.04	0.12	0.11	0.03	0.03	0.05	0.18	0.20
Biphenyl	--	--	--	--	0.01	0.02	0.01	0.02
1,3-Butadiene	--	--	--	--	0.02	0.03	0.02	0.03
Ethyl Benzene	0.10	0.31	--	--	--	--	0.10	0.31
Formaldehyde	0.64	2.00	0.01	0.01	3.60	5.83	4.25	7.84
Hexane	--	--	--	--	0.08	0.12	0.08	0.12
Methanol	--	--	--	--	0.17	0.28	0.17	0.28
Naphthalene	0.01	0.01	0.02	0.01	--	--	0.03	0.02
PAHs	0.01	0.02	--	--	--	--	0.01	0.02
Propylene	--	--	0.40	0.10	--	--	0.40	0.10
Toluene	0.40	1.30	0.04	0.01	0.03	0.05	0.47	1.36
Xylene	0.20	0.62	0.03	0.01	0.01	0.02	0.24	0.65
<b>Total</b>	<b>1.55</b>	<b>4.83</b>	<b>0.61</b>	<b>0.16</b>	<b>4.89</b>	<b>7.94</b>	<b>7.05</b>	<b>12.92</b>

**DAQ Review of Emissions Methodology**

All emission factors and calculation methodologies were deemed appropriate. With the use of CEMS and compliance testing, the ultimate validity of the emission factors will be tested repeatedly on a periodic post-issuance basis.

## **REGULATORY APPLICABILITY**

The Pleasants Energy, LLC facility is subject to a variety of substantive state and federal air quality rules and regulations. They are as follows: 45CSR13, 45CSR14, 45CSR16, 45CSR30, 45CSR33, 45CSR34, 40 CFR 60 - Subpart GG, 40 CFR 60 Subpart III, 40 CFR 60 Subpart JJJJ and 40 CFR 63 - Subpart ZZZZ. It should be noted that Subparts IIII (emergency generators), Subpart JJJJ (turbophase engines) and Subpart ZZZZ (generators and turbophase engines) apply to equipment that is not being effected by this modification. Those rules were addressed in previous permitting actions and therefore will not be addressed here.

Each applicable rule, and Pleasants proposed compliance thereto, will be discussed in detail below. Additionally, those rules that have questionable applicability but do not apply will also be discussed.

### ***WV State-Implementation-Program (SIP) Regulations***

#### **45CSR2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers. (Not Applicable)**

The combustion turbines themselves do not meet the definition of "fuel burning unit" because they do not produce power through *indirect heat transfer*.

#### **45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides (Not Applicable)**

The combustion turbines themselves do not meet the definition of "fuel burning unit" because they do not produce power through *indirect heat transfer*.

#### **45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation**

The modification of the Pleasants Energy, LLC Plant is defined as a construction of a major source under 45CSR14. The project will be either major or "significant" as defined in 45CSR14 for all criteria pollutants (and Greenhouse Gasses) with the exception of VOCs and SO<sub>2</sub>. Therefore, the proposed VOC and SO<sub>2</sub> emissions will be permitted under Rule 13.

As required under §45-13-8.3, Pleasants Energy, LLC placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is ...

located." The ad ran on September 26, 2015 in the *Pleasants County Leader* and the affidavit of publication for this legal advertisement was submitted on October 8, 2015.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration

45CSR14 sets the requirements for new construction of "major stationary sources" (as defined under §45-14-2.43) of air pollution, on a pollutant-by-pollutant basis, in areas that are in attainment with the National Ambient Air Quality Standards (NAAQS). Pursuant to §45-14-7.1, PSD review additionally applies to each pollutant proposed to be emitted in "significant" (as defined under §45-14-2.74) amounts. Although the Pleasants Energy, LLC facility is an existing source it will be treated as the construction of a new major stationary source Per 40 CFR 52.21(r)(4);

*"At such time that a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements or paragraphs (j) through (s) of this section shall apply to the source or modification as though construction had not yet commenced on the source or modification."*

The facility is located in Pleasants County, WV, which is classified as in attainment with all NAAQS. The modification of the facility is defined as a construction of a "major stationary source" under 45CSR14 (see above) and PSD review is required for the pollutants of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, TSP, and Greenhouse Gasses (see Table 6). Note that the major source threshold for simple cycle gas fired turbines is 250 tons per year. Therefore emission of both CO and NO<sub>x</sub> classify the facility as "major". Additionally, since the facility is considered a major source, emissions exceeding 25 tpy, 15 tpy and 10 tpy of PM, PM<sub>10</sub> and PM<sub>2.5</sub> respectively subject those pollutants to PSD review since they are defined as "significant". The substantive requirements of a PSD review include a best available control technology (BACT) analysis, a modeling analysis, and an additional impacts analysis; each of these will be discussed in detail under the section PSD REVIEW REQUIREMENTS.

It is important to note that only the combustion turbines are undergoing PSD review under 45CSR14. This is because if we look back at the additions of, 1) the black start generators and 2) the TurboPhase engines, we can see that neither project would have triggered PSD review even if it was assumed that the facility had been an existing major stationary source.

Specifically, installation of the generators increased emissions as follows:

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**Table 13: Generator Emissions (all 5 engines combined, per G60C-067)**

Pollutant	PSD Sig. Threshold	Annual (ton/yr)	PSD (Y/N)
CO	100 tpy	31.47	N
NO <sub>x</sub>	40 tpy	6.03	N
PM	25.00	0.90	N
PM <sub>10</sub>	15.00	0.90	N
PM <sub>2.5</sub>	10.00	0.90	N
VOCs	40.00	3.60	N
SO <sub>2</sub>	40.00	0.07	N
GHG's (CO <sub>2e</sub> )	75,000.00	5,850.00	N

Similarly, installation of the TurboPhase engines increased emissions as follows:

**Table 14: TurboPhase Engine Emissions (all 8 engines combined, per R13-2373B)**

Pollutant	PSD Sig. Threshold	Annual (ton/yr)	PSD (Y/N)
CO	100 tpy	8.66	N
NO <sub>x</sub>	40 tpy	39.40	N
PM	25.00	2.60	N
PM <sub>10</sub>	15.00	2.60	N
PM <sub>2.5</sub>	10.00	2.60	N
VOCs	40.00	2.36	N
SO <sub>2</sub>	40.00	0.12	N
GHG's (CO <sub>2e</sub> )	75,000.00	25,879.00	N

#### 45CSR16: Standards of Performance for New Stationary Sources

45CSR16 incorporates by reference applicable requirements under 40 CFR 60. 40 CFR 60 Subpart GG applies to the facility (see below under Federal Regulations).

#### 45CSR30: Requirements for Operating Permits

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The Pleasants Energy, LLC facility is subject to the requirements Title V and changes authorized by this permitting action must also be incorporated into the facility's Title V operating permit. Commencement of the operations authorized by this permit shall be determined by the appropriate timing limitations associated with Title V permit revisions per 45CSR30.

#### 45CSR33: Acid Rain Provisions and Permits

45CSR33 incorporates by reference applicable requirements under 40 CFR 72-77. The proposed combustion turbines will be subject to the Acid Rain Program including emissions standards (40 CFR 72.9), monitoring requirements (40 CFR 75) and permitting provisions (40 CFR 72.3).

### **FEDERAL REGULATIONS**

#### 40 CFR 60, Subpart GG: Standards of Performance for Stationary Gas Turbines

Subpart GG of 40 CFR 60 establishes limits for NO<sub>x</sub> and SO<sub>2</sub> emissions from stationary gas-fired turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (10MMBTU/hr), based on the lower heating value of the fuel fired. The Pleasants Energy Project turbines will each have a heat input (fuel flow) of approximately 1, 571 MMBTU per hour at 59° F at full load, making each turbine subject to the requirements of Subpart GG as per 40 CFR 60.330. Subpart GG contains emission standards (for NO<sub>x</sub> and SO<sub>2</sub>) in addition to notification, monitoring and testing requirements. The applicable standard limiting the discharge of NO<sub>x</sub> into the atmosphere from each turbine is expressed as:

$$\text{STD} = 0.0075 * (14.4/Y) + F$$

where:

STD = allowable NO<sub>x</sub> emissions (percent volume at 15 percent oxygen and on a dry basis)

Y = manufacturer's rated heat rate at manufacturers rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not to exceed 14.4 kilojoules per watt hour.

F = NO<sub>x</sub> emission allowance for fuel-bound nitrogen as defined in paragraph (a)(3) of this section.

The heat input rate for each of the GE 7FA turbines on natural gas firing is 9.87 kJ/W-hr at 100% load and 59° F. Therefore, the NSPS limitation for NO<sub>x</sub> is 109 ppmvd at 15% oxygen. The anticipated emission rate for the Pleasants Energy Project turbines is 9.0 ppmvd at 15% O<sub>2</sub> while combusting natural gas and 42 ppmvd at 15% O<sub>2</sub> when combusting fuel oil both of which are well below the NSPS emission limit for NO<sub>x</sub>. The emissions limit set forth in the permit will be more stringent than the limit specified under the NSPS.

Under the Subpart GG NSPS, SO<sub>2</sub> is limited to 0.015% SO<sub>2</sub> by volume (150 ppmvd corrected to 15 percent O<sub>2</sub>), and fuel oil sulfur content is limited to less than 0.8 percent by weight. The Pleasants Energy, LLC facility will meet these criteria by using natural gas as the primary fuel source. The facility has a current permit limit of 0.5 grains per 100 scf which is approximately 8 ppmvd. Further, the distillate fuel oil is limited to an annual average sulfur content of 0.05% by weight. Fuel sulfur content for the turbines is, therefore, below the NSPS requirements. The corresponding maximum flue gas SO<sub>2</sub> concentrations will also be well below the NSPS standards, with SO<sub>2</sub> emissions of about 1 ppmvd corrected to 15 percent O<sub>2</sub> during gas firing and 10 ppmvd corrected to 15 percent O<sub>2</sub> during fuel oil firing.

Pleasants Energy, LLC will continue to follow existing permit requirements for fuel monitoring to satisfy the monitoring requirements for sulfur content of the natural gas as required in 40 CFR 60.334.

40 CFR 60 Subpart KKKK: Standards of Performance for Stationary Combustion Turbines (*Not Applicable*)

Subpart KKKK is only applicable to stationary combustion turbines that commenced construction, modification or reconstruction after February 18, 2005. The Pleasants Energy, LLC turbines commenced construction in 2001. Additionally, simply increasing the hours of operation alone, does not meet the definition of "modified" per 40 CFR 60.14(e)(3).

40 CFR 60 Subpart TTTT: Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units (*Not Applicable*)

Subpart TTTT is only applicable to stationary combustion turbines that commenced construction after January 8, 2014 or reconstruction after June 18, 2015. The Pleasants Energy, LLC turbines commenced construction in 2001. Additionally, simply increasing the hours of operation alone, does not meet the definition of "reconstruction" per the NSPS.

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## **PSD REVIEW REQUIREMENTS**

In 1977 Congress passed the Clean Air Act Amendments (CAAA), which included the Prevention of Significant Deterioration (PSD) program. This program was designed to allow industrial development in areas that were in attainment with the NAAQS without resulting in a non-attainment designation for the area. The program, as implied in the name, permits the deterioration of the ambient air in an area (usually a county) as long as it is within defined limits (defined as increments). The program, however, does not allow for a significant (as defined by the rule) deterioration of the ambient air. The program prevents significant deterioration by allowing concentration levels to increase in an area within defined limits - called pollutant increments - as long as they never increase enough to exceed the NAAQS. Projected concentration levels are calculated using complex computer simulations that use meteorological data to predict impacts from the source's potential emission rates. The concentration levels are then, in turn, compared to the NAAQS and increments to verify that the ambient air around the source does not significantly deteriorate (violate the increments) or violate the NAAQS. The PSD program also requires application of best available control technology (BACT) to new or modified sources, protection of Class 1 areas, and analysis of impacts on soils, vegetation, and visibility.

WV implements the PSD program as a SIP-approved state through 45CSR14. As a SIP-approved state, WV is the sole issuing authority for PSD permits. EPA has reviewed 45CSR14 and concluded that it incorporates all the necessary requirements to successfully meet the goals of the PSD program as discussed above. EPA retains, however, an oversight role in WV's administration of the PSD program.

As stated above, the modification of the Pleasants Energy, LLC Plant is defined as a construction of a "major stationary source" under 45CSR14 and PSD review is required for the pollutants of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, TSP, and Greenhouse Gasses. The substantive requirements of a PSD review includes a best available control technology (BACT) analysis, a modeling analysis, and an additional impacts analysis - each of which will be discussed below.

### **BACT Analysis - Section 8.2**

Pursuant to 45CSR14, Section 8.2, Pleasants Energy, LLC is required to apply BACT to each emission source that is constructed and emits a PSD pollutant. BACT is defined under §45-14-2.12 as:

"...an emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the Secretary, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel

cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any federally enforceable emissions limitations or emissions limitations enforceable by the Secretary. If the Secretary determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results."

A determination of an appropriate BACT emission limit is conducted by using a "top-down" analysis. The key steps in performing a "top-down" BACT analysis are the following: 1) Identification of all applicable control technologies; 2) Elimination of technically infeasible options; 3) Ranking remaining control technologies by control effectiveness; 4) Evaluation of most effective controls and documentation of results; and 5) the selection of BACT. Also included in the BACT selection process is the review of BACT determinations at similar facilities using the RACT/BACT/LAER Clearinghouse (RBLC). The RBLC is a database of RACT, BACT, and LAER determinations maintained by EPA and updated by the individual permitting authorities. It can be accessed online at <http://cfpub.epa.gov/rbcl/>. Pleasants Energy, LLC included a BACT analysis in their permit application generally using the top-down approach as described above. Their complete analysis, including appropriate economic calculations, is included in the Pleasants Energy, LLC permit application and amendments and revisions thereto.

The following table summarizes the Pleasants Energy, LLC BACT selections.

**Table 15: BACT Selection**

Source	PSD Pollutant <sup>(1)</sup>							
	CO		NO <sub>x</sub>		PM <sub>2.5</sub> /PM <sub>10</sub> /PM <sup>(2)</sup>		GHGs	
	Limit	Tech. <sup>(3)</sup>	Limit	Tech. <sup>(3)</sup>	Limit	Tech. <sup>(3)</sup>	Limit (CO <sub>2e</sub> )	Tech. <sup>(3)</sup>
Turbines <sup>(4)</sup>	9 ppm 20 ppm	CP	9.0 ppm 42 ppm	DLNB, Water Inject	15.0 lb./hr w/o TP 17.2 lb/hr w/ TP 39 lb/hr	AF, NG, ULSD	1,297 lb/ MW-hr 1,570 lb/ MW-hr	NG, GE7FA

(1) Emission rates at loads of 60% or higher.

(2) PM emission rates are given in total particulate (filterable + condensable) matter

(3) CP=Good Combustion Practices; DLNB = Dry Low NO<sub>x</sub> Burners; AF = inlet air filtration; NG = Use of Natural Gas as a fuel; ULSD = use of Ultra Low Sulfur Diesel as a fuel; GE7FA = use of GE Frame 7FA.03 turbines.

(4) Where 2 limits exist, the upper limit is when firing natural gas and the bottom limit is when firing fuel oil.

## Combustion Turbines

### **$NO_x$**

- (1) Technology Identification: Pleasants Energy, LLC identified the following as potential  $NO_x$  control technologies applicable to the Combustion Turbines;

- \* Xonon™
- \* Water or Steam Injection
- \* Dry Low  $NO_x$  Burners
- \* SCR
- \* SNCR
- \* SCONO<sub>x</sub>™ (aka EM<sub>x</sub>™)

- (2) Technically Infeasible Determinations: The only technologies that were determined to be technically infeasible under (1) above was the use of Xonon, SCONO<sub>x</sub> and SNCR. Xonon systems have not had wide-scale applications. It has been demonstrated on a 1.5 MW baseload unit in California, however, testing data to apply this technology to other types and sizes of turbines is currently unavailable. As the Pleasants turbines are expected to experience repeated start ups and shut downs, it is unclear how the changing load conditions would affect the Xonon system.

SCONO<sub>x</sub> systems operate most effectively at temperatures ranging from 300° to 700° F. Additionally, it uses steam to periodically regenerate the catalyst bed. Since the Pleasants facility is a simple cycle system its exhaust is significantly hotter (around 1,000°F) and has no steam readily available. Therefore, the technology was considered infeasible.

SNCRs operate most effectively at temperatures ranging from 1,600°F to 2,100°F. At operations below these temperatures the reagent will not react with the  $NO_x$  and ammonia slip will be very high. The flue gases from the combustion turbines have an exhaust temperature of around 1,000°F. Therefore, the technology was considered infeasible.

- (3) Effectiveness Ranking of Remaining Technologies: Pleasants Energy, LLC ranked SCR as the top control technology with a resulting  $NO_x$  emission rate of between 2.0 and 5.0 ppmvd @ 15% O<sub>2</sub> for natural gas and 9 to 24 ppm for fuel oil. After SCR, Dry Low  $NO_x$  burners (natural gas) and water injection (fuel oil) were selected which result in  $NO_x$  emissions of 9 ppm and 42 ppm respectively.
- (4) Economically Infeasible Determinations: Pleasants Energy, LLC performed an economic analysis of the cost to install SCRs at its Waverly facility. Per 40 CFR 52.21(r)(4) the analysis looked only at the cost of installing the equipment at a new facility and ignored retrofit costs. WVDAQ reviewed the analysis and determined that it seems to comply with the OAQPS Control Cost Manual (EPA 2002). The analysis indicated that the capital cost to

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install an SCR system at the facility would be approximately \$19,015,000 with an annualized cost of \$2,912,855 while reducing NO<sub>x</sub> emissions by 174 tons per year. It should be noted that you cannot calculate the NO<sub>x</sub> reduction by simply applying a 78% (the reduction from a steady state emission level of 9ppm to 2ppm) control efficiency to the entire annual NO<sub>x</sub> emissions found in Table 6. This is because a disproportionate amount of NO<sub>x</sub> emissions occur during start up when the SCR could not be used. Using the annualized cost shown above, and a emissions reduction of 174 tons per year, this equates to an incremental cost of \$16,740.55 per ton of NO<sub>x</sub> removed. In the writers opinion, this is not economically feasible.

- (5) DAQ Review of RBLC: The following table was constructed using data for the 5 most recent entries for large gas fired simple cycle combustion turbines from the RBLC (note only entries with NO<sub>x</sub> emissions stated as ppm were considered):

**Natural Gas**

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	9 ppm
TX-0788	03/24/2016	APEX Texas Power	9 ppm
TX-0777	12/09/2015	Navasota South	9 ppm
TX-0769	10/27/2015	Navasota North	9 ppm
TX-0764	10/14/2015	Nacogdoches Power	9 ppm
<b>Avg. Emission Rate</b>			9 ppm

**Fuel Oil**

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	42 ppm
WI-0240	01/26/2006	Wisconsin Elec. Power	65 ppm
NV-0036	05/05/2005	Newmont Nevada Energy	6 ppm
MD-0031	04/01/2005	Mirant Mid Atlantic	42 ppm
MS-0072	12/10/2004	TVA-Kemper	42 ppm
<b>Avg. Emission Rate</b>			39.4 ppm

With respect to NO<sub>x</sub> emissions, Pleasants Energy, LLC's proposed emission rate of 9 ppmvd for natural gas firing is exactly the same as other recent RBLC entries. None of the other units employed any NO<sub>x</sub> control technology other than DLNB. Pleasants proposed emission rate of 42 ppm when firing fuel oil is similar to the average of the last five entries into the RBLC. It is exactly the same as three of the last five, while being higher than one entry and lower than the other. It should be noted that the one entry (NV-0036) that is significantly lower than the Pleasants proposed rate is for a facility that used simple cycle turbines as a backup at a coal fired plant. Because the turbines are located at a coal fired plant, an SCR system is already available making it more cost effective than it would be for Pleasants Energy, LLC. Other than NV-0036, no other facility requires any control except for water injection.

## CO

- (1) Technology Identification: Pleasants Energy, LLC identified Oxidation Catalysts and SCONO<sub>x</sub> as the only potential post combustion control technologies.
- (2) Technically Infeasible Determinations: Pleasants Energy, LLC determined that SCONO<sub>x</sub> was not considered feasible for reasons discussed under "NO<sub>x</sub>".
- (3) Effectiveness Ranking of Remaining Technologies: Oxidation Catalyst is the only remaining control technology.
- (4) Economically Infeasible Determinations: Pleasants Energy, LLC performed an economic analysis of the cost to install an Oxidation Catalyst at its Waverly facility. Per 40 CFR 52.21(r)(4) the analysis looked only at the cost of installing the equipment at a new facility and ignored retrofit costs. WVDAQ reviewed the analysis and determined that it seems to comply with the OAQPS Control Cost Manual (EPA 2002). The analysis indicated that the capital cost to install an Oxidation Catalyst system at the facility would be approximately \$8,568,365 with an annualized cost of \$1,219,367 while reducing CO emissions by 68.5 tons per year. It should be noted that you cannot calculate the CO reduction by simply applying a 78% (the reduction from a steady state emission level of 9ppm to 2ppm) control efficiency to the entire annual CO emissions found in Table 6. This is because a disproportionate amount of CO emissions occur during start up when the Oxidation Catalyst could not be used. Using the annualized cost shown above, and a emissions reduction of 68.5 tons per year, this equates to an incremental cost of \$17,800.98 per ton of CO removed. In the writers opinion, this is not economically feasible.
- (5) DAQ Review of RBLC: The following table was constructed using data for the 5 most recent entries for large gas fired simple cycle combustion turbines

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from the RBLC (note only entries with CO emissions stated as ppm were considered):

#### Natural Gas

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	9 ppm
TX-0788	03/24/2016	APEX Texas Power	9 ppm
TX-0777	12/09/2015	Navasota South	9 ppm
TX-0769	10/27/2015	Navasota North	9 ppm
TX-0764	10/14/2015	Nacogdoches Power	9 ppm
<b>Avg. Emission Rate</b>			9 ppm

#### Fuel Oil

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	20 ppm
NV-0036	05/05/2005	Newmont Nevada Energy	6 ppm
MD-0031	04/01/2005	Mirant Mid Atlantic	20 ppm
MS-0072	12/10/2004	TVA-Kemper	20 ppm
FI-0261	10/26/2004	City of Tallahassee	6 ppm
<b>Avg. Emission Rate</b>			14.4 ppm

With respect to CO emissions, Pleasants Energy, LLC's proposed emission rate of 9 ppmvd for natural gas firing is exactly the same as other recent RBLC entries. None of the other units employed any CO control technology other than good combustion practices. Pleasants proposed emission rate of 20 ppm when firing fuel oil is similar to the average of the last five entries into the RBLC. It is exactly the same as three of the last five, while being higher than the other two. It should be noted that the two entries (NV-0036 & FI-0261) that are significantly lower than the Pleasants proposed rate are for turbines that co-located with non turbine generating sources. In the case of NV-0036 the turbines are used as a backup at a coal fired plant. In the case of FI-0261 the turbines are used along side much larger natural gas fired boilers. Because the turbines are located at facilities with other types of sources, an Oxidation Catalyst system is likely more cost effective than it would be for Pleasants Energy, LLC. Other than NV-0036 and FI-0261, no other facility requires any control except for good combustion practices.

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- (1) Technology Identification: Pleasants Energy, LLC identified the following as potential particulate control technologies applicable to the Combustion Turbines;

- \* Fabric Filters/Baghouses
- \* Electrostatic Precipitators (ESPs)
- \* Good Combustion Practices/high efficiency filtration of the turbine inlet and SCR dilution air.
- \* Replacement of existing turbines with newer, more efficient turbines.

- (2) Technically Infeasible Determinations: Each of the post-combustion control technologies (i.e. baghouses and ESPs) are generally available. However, none of the technologies are considered practical or technically feasible for installation on gaseous fuel or oil fired combustion turbines.

Baghouses, ESPs, and scrubbers have never been applied to commercial combustion turbines burning gaseous fuels or oil fuels. Baghouses, ESPs, and scrubbers are typically used on solid fuel fired sources with high PM emission concentrations, and are not used in gaseous fuel-fired applications, which have inherently low PM emission concentrations. None of these control technologies is appropriate for use on gaseous or fuel oil fired combustion turbines because of their very low PM emissions levels, and the small aerodynamic diameter of PM from gaseous fuel combustion. Review of the RBLCL indicates that post-combustion controls have not been required as BACT for gaseous or fuel oil fired combustion turbines. Therefore, the use of baghouses, ESPs, and scrubbers is not considered technically feasible.

- (3) Effectiveness Ranking of Remaining Technologies: The only remaining technologies are 1) replacement of existing turbines with newer (GE FA.05) ones and 2) filtration of the turbine inlet air.

- (4) Economically Infeasible Determinations: Pleasants Energy, LLC performed an economic analysis of the cost to install two new GE 7FA.05 turbines at its Waverly facility. Per 40 CFR 52.21(r)(4) the analysis looked only at the cost of installing the equipment at a new facility and ignored demolition costs. WVDAQ reviewed the analysis and determined that it seems to comply with the OAQPS Control Cost Manual (EPA 2002). The analysis indicated that the capital cost to install the new turbines at the facility would be approximately \$73,609,000 with an annualized cost of \$5,932,000 while reducing PM emissions by 49.58 tons per year. It should be noted that Pleasants calculated a reduction of only 19 tons per year, but apparently assumed that fuel oil emissions from the new turbines would remain at 39

pounds per hour. This is obviously erroneous so the writer performed his own calculations to obtain the annual emissions reductions using the following method:

The writer used the scenario from Appendix C of the application that results in the highest PM (100% natural gas usage) and thus would be expected to see the greatest reduction. It may seem counterintuitive that the highest PM emissions occur under the scenario in which no fuel oil is used. However, this occurs because the permit will contain a condition which reduces the amount of natural gas which can be used for each gallon of fuel oil used. This has the effect of severely reducing the annual hours of operation whenever fuel oil is used. As can be seen in Appendix C, the turbines can operate a maximum of 6,195 hours each if only natural gas is used but can only operate 375 hours each if the maximum amount of fuel oil is used.

Using the above scenario, new turbines would emit:

$$(3250 \text{ hrs/yr} * 9.2 \text{ lbs/hr}) + ((6195 \text{ hrs/yr} - 3250 \text{ hrs/yr}) * 7.0 \text{ lbs/hr}) = 25.26 \text{ tons per year per turbine or } 50.52 \text{ tons per year total.}$$

As can be seen from Table 6 above, PM emissions from the existing turbines will be 100.10 tons per year.

$$100.1 \text{ tpy} - 50.52 \text{ tpy} = 49.58 \text{ tpy}$$

Using the annualized cost shown above, and a emissions reduction of 49.58 tons per year, this equates to an incremental cost of \$119,645.01 per ton of PM removed. In the writers opinion, this is not economically feasible.

- (5) DAQ Review of RBLC: The following table was constructed using data for the 5 most recent entries for large gas fired simple cycle combustion turbines from the RBLC. Note that only entries with either particulate emissions stated as lb/hr or with enough information to easily convert limits to lb/hr were considered:

#### Natural Gas

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	14.0 lb/hr
TX-0788	03/24/2016	APEX Texas Power	13.4 lb/hr
TX-0777	12/09/2015	Navasota South	8.6 lb/hr
TX-0769	10/27/2015	Navasota North	8.6 lb/hr
TX-0764	10/14/2015	Nacogdoches Power	12.09 lb/hr
<b>Avg. Emission Rate</b>			<b>11.34 lb/hr</b>

## Fuel Oil

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	9.8 lb/hr
MI-0400	06/29/2011	Wolverine Power Supply	16.2 lb/hr
OH-0333	12/03/2009	Dayton Power & Light	29 lb/hr <sup>1</sup>
TX-0506	04/19/2006	NRG Texas	15 lb/hr
OH-0253	03/07/2006	Dayton Power & Light	15 lb/hr <sup>1</sup>
<b>Avg. Emission Rate</b>			<b>17 lb/hr</b>

<sup>1</sup>Filterable only.

With regards to PM, Pleasants Energy, LLCs proposed BACT emission rate of 17.2 pounds per hour when firing natural gas and 39 pounds per hour when firing fuel oil is significantly higher than the average of the past five entries in the RBLC for each fuel type. This can be explained by noting that two of the entries for filterable PM only while the Pleasants limit applies to total particulate (filterable and condensable). Additionally, the turbines are newer and likely a more efficient generation of turbines. As shown above, it is economically infeasible for Pleasants to replace the existing units with new turbines.

## GHGs

- 1) Technology Identification: Pleasants Energy, LLC identified two broad strategies for reducing GHG emissions from combustion turbines: 1) minimize the production of GHGs through the use of low carbon fuels and energy efficient design; and 2) carbon capture and sequestration (CCS).

- 2) Technically Infeasible Determinations:

In the application, Pleasants states the following:

*"...existing CO<sub>2</sub> capture technologies have not been applied at large power plants, as the energetic costs are prohibitive, and while more efficient approaches are being investigated, none have currently been developed past the pilot-stage. Even though post-combustion technology for CO<sub>2</sub> capture has not been demonstrated on a simple-cycle combustion turbine, the EPA has stated that it is considered technologically feasible, however this Project will not have a pure CO<sub>2</sub> stream as it is a peaking plant and will ramp up and down and start-up and shut-down daily when it operates. However, a published cost estimate for a 235 MW slipstream pilot project in West Virginia is \$668 million, so scaling that linearly to a*

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size capable of handling the approximate 300 net MW capacity of this Project would be over \$852 million. Potential carbon sequestration sites in West Virginia may exist, but the technologies to use them are mostly still in the pilot-scale phase of development, and Pleasants Energy would need to do much more investigation in order to discover where the sites are, if any, and characterize them enough to demonstrate the long-term viability of the locations. When looking at cost to construct a pipeline that may not need to be more than 50 miles, as determined from another power project (IPL Ottumwa Generating Station –in Iowa) using an average cost of approximately \$1.4 million/mile of pipeline this cost is over \$70 million. The capital costs would also need to include costs for gas compression, additional injection and monitoring wells necessary to handle the volume of CO<sub>2</sub> produced, pipeline right-of-way, operation and maintenance costs, etc.

*The facts are that the qualitative cost estimate of capture and sequestration is quite high, the technological effectiveness for the capture equipment for a unit of this size has not been demonstrated in practice yet, and there is uncertainty as to whether locations capable of storing the large amounts of CO<sub>2</sub> that would be produced per year exist within a closer radius of the plant, and the fact that the Pleasants Energy facility does not have a pure CO<sub>2</sub> stream are sufficient to eliminate this option without requiring a more detailed site-specific technological or economic analysis.”*

- (3) Effectiveness Ranking of Remaining Technologies: Pleasants Energy, LLC ranked using thermally efficient turbines in conjunction with lower carbon fuels as the top control technology with a resulting GHG emission rate of 1,570 lb CO<sub>2e</sub>/MW-hr when firing fuel oil. Pleasants Energy, LLC did not propose a BACT level for the turbines when firing fuel oil. Therefore the permit will set the BACT at 1,297 lb CO<sub>2e</sub>/MW-hr which is the fuel oil BACT level pro rated to maximum natural gas hourly emission rate.
- (4) Economically Infeasible Determinations: Since Pleasants Energy, LLC selected the top technically feasible control technologies, no economic determinations are necessary.
- (5) DAQ Review of RBLC: The following table was constructed using data for the 5 most recent entries for large gas fired simple cycle combustion turbines from the RBLC (note that only entries with GHG emission limits in lb/MW-hr were used):

#### Natural Gas

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	1,434 lb/MW-hr
TX-0788	03/24/2016	APEX Texas Power	1,341 lb/MW-hr
TX-0778	12/16/2015	Navasota South	1,461 lb/MW-hr
TX-0775	11/13/2015	Navasota South	1,461 lb/MW-hr
FL-0355	09/10/2015	Florida Power & Light	1,374 lb/MW-hr
<b>Avg. Emission Rate</b>			1,414 lb/MW-hr

#### Fuel Oil<sup>1</sup>

RBLC ID	Date	Company	BACT Emission Rate
TX-0794	04/07/2016	Brazos Elec. Coop.	1,434 lb/MW-hr
FL-0355	09/10/2015	Florida Power & Light	1,874 lb/MW-hr
<b>Avg. Emission Rate</b>			1,654 lb/MW-hr

<sup>1</sup>The writer could only find two GHG limits in the RBLC for large, simple cycle combustion turbines firing fuel oil.

Comparisons among the various combustion turbines are somewhat complicated in that different bases can be used to establish certain parameters. For example, combustion turbine outputs can be specified on a net or gross basis, and can vary based on fuel, load, ambient temperature, and other factors. GHG emission rates can be specified on a LHV or HHV basis. Nevertheless, in context, the Pleasants Energy, LLC combustion turbines compare favorably with other recent combustion turbine projects.

#### DAQ Conclusion on BACT Analysis

The DAQ has concluded that, with the exceptions noted above and corrected for, Pleasants Energy, LLC correctly conducted a BACT analysis using the top-down analysis and eliminated technologies for appropriate reasons. The DAQ concludes that the emission rates under Table 14 are achievable, are consistent with recent applicable BACT determinations on the RBLC, and are accepted as BACT. Further, the DAQ accepts the selected technologies and proposed efficiency rates as BACT.

## ***Modeling Analysis - 45CSR14 Section 9 and Section 10***

45CSR14 Section 9 requires subject sources to demonstrate that "allowable emission increases from the proposed source or modification, in conjunction with all other applicable emission increases or reductions would not cause or contribute to " a NAAQS violation or an exceedance of a maximum allowable increase over the baseline concentration in any area. This typically includes modeling of effects in both "Class I" and "Class II" areas.

Pleasants Energy, LLC was required to do a modeling analysis to determine the potential impacts on Class I and Class II areas. The pollutants required to be modeled were the pollutants undergoing PSD review: CO, NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>. Greenhouse gases are not modeled as part of the PSD application review process. The results of the modeling analyses are summarized below. More detailed descriptions of these modeling analyses and quantitative results are contained in reports attached to this evaluation as Attachment A. The reports were prepared by Jon McClung of DAQs Planning Section.

### Class I Modeling

As part of the Clean Air Act Amendments (CAA) of 1977, Congress designated a list of national parks, memorial parks, wilderness areas, and recreational areas as federal Class I air quality areas. Federal Class I areas are defined as national parks over 6,000 acres, and wilderness areas and memorial parks over 5,000 acres. As part of this designation, the CAA gives the Federal Land Managers (FLM's) an affirmative responsibility to protect the natural and cultural resources of Class I areas from the adverse impacts of air pollution. The impacts on a Class I area from an emissions source are determined through complex computer models that take into account the source's emissions, stack parameters, meteorological conditions, and terrain.

If an FLM demonstrates that emissions from a proposed source will cause or contribute to adverse impacts on the air quality related values (AQRV's) of a Class I area, and the permitting authority concurs, the permit will be denied. The AQRVs typically reviewed, in the case of evaluating adverse impacts, are visibility (both regional and direct plume impact) and acid deposition (including both nitrogen and sulfur).

Additionally, the Class I Increments designated under National Ambient Air Quality Standards (NAAQS) may not be exceeded. Class I Increments are limits to how much the air quality may deteriorate from a reference point (called the baseline). There are Class I Increments for NO<sub>2</sub>, PM<sub>10</sub>, and SO<sub>2</sub>.

There are generally four Class I areas that may have to be considered when conducting PSD reviews in West Virginia. These are, in West Virginia, the Otter Creek Wilderness Area and the Dolly Sods Wilderness Area; both of which are managed by the US Forest Service. The Shenandoah National Park, managed by the National Park Service, and the James River Face Wilderness Area, managed by the US Forest Service,

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are in Virginia. The Pleasants Energy, LLC facility is approximately 81 miles from the Otter Creek Wilderness Area, 99 miles from the Dolly Sods Wilderness Area, 124 miles from the Shenandoah National park, and 157 miles from the James River Face Wilderness Area.

On September 29, 2015, WVDAQ provided details of Pleasants Energy, LLCs proposed project to both the US Forest Service and the National Park Service. On October 6, 2015, both agencies requested copies of the permit application which WVDAQ provided on October 7, 2015. During followup conversations both the USFS and NPS requested that Pleasants perform a Class I modeling analysis for all four previously mentioned Class I areas. On March 2, 2016, Pleasants submitted to WVDAQ, USFS and NPS the final report detailing the results from said analysis.

Pleasants used CALPUFF to model both visibility and deposition effects on the Class I areas. Additionally, Pleasants performed a Class I increment analysis. The results indicated that the project should not have any noticeable effect on visibility nor have any adverse impacts resulting from deposition. As shown below in Tables 15 and 16, when evaluating the impacts as they relate to the Class I Significant Impact Levels (SILs), the modeling showed that even at a distance of 50 km (31 miles) most impacts were below the SILs and all impacts were below the SILs at the actual Class I areas.

**Table 16**

Pollutant	Averaging Period	Maximum Modeled value at 50 kilometer receptor ( $\mu\text{g}/\text{m}^3$ )				Class I Significant Impact Level ( $\mu\text{g}/\text{m}^3$ )
		Otter Creek Wilderness	Dolly Sods Wilderness	Shenandoah National Park	James River Face Wilderness	
PM <sub>10</sub>	24-hour	0.0972	0.0499	0.0526	0.0733	0.3
	Annual	0.0036	0.0018	0.0018	0.0020	0.2
PM <sub>2.5</sub>	24-hour	<b>0.0972<sup>1</sup></b>	0.0499	0.0526	<b>0.0733<sup>1</sup></b>	0.07
	Annual	0.0036	0.0018	0.0018	0.0020	0.06
NO <sub>2</sub>	Annual	0.0139	0.0071	0.0071	0.0078	0.1

<sup>1</sup>Value exceeded the SIL.

**Table 17**

Maximum Modeled value ( $\mu\text{g}/\text{m}^3$ )		Class I Significant Impact Level ( $\mu\text{g}/\text{m}^3$ )
Otter Creek Wilderness	James River Face Wilderness	
0.0401	0.0146	0.07



## Class II Modeling

A Class II Modeling analysis can require up to three runs to determine compliance with Rule 14. First, the proposed source is modeled by itself, on a pollutant by pollutant basis, to determine if it produces a "significant impact;" an ambient concentration published by US EPA. If the dispersion model determines that the proposed source produces significant impacts, then the demonstration proceeds to the second stage. If the model finds that the proposed source produces "insignificant impacts", no further modeling is needed. The modeling indicated that only the 1 hour standard for NO<sub>2</sub> and 24 hour standard for PM<sub>2.5</sub> were "significant" (see Table 17) thereby requiring the applicant to proceed to the next stage of the modeling process for those pollutants.

**Table 18**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>Year</b>	<b>Maximum Modeled Concentration (µg/m<sup>3</sup>)</b>	<b>Significant Impact Level (SIL) (µg/m<sup>3</sup>)</b>
NO <sub>2</sub>	Annual	2012	0.1	1
	1-hour	5 years	<b>45.7<sup>1</sup></b>	7.5
CO	1-hour	2012	174.3	2000
	8-hour	2013	80.0	500
PM <sub>10</sub>	Annual	2012	0.03	1
	24-hour	2014	2.8	5
PM <sub>2.5</sub>	Annual	5 years	0.02	0.3
	24-hour	5 years	<b>2.1<sup>1</sup></b>	1.2

<sup>1</sup>Value exceeded the SIL

The next tier for those standards which exceed the SIL (in this case the 1 hour NO<sub>2</sub> standard and 24 hour PM<sub>2.5</sub> standard) of the modeling analysis is to determine if the proposed facility in combination with the existing sources will produce an ambient impact that is less than the National Ambient Air Quality Standards (NAAQS).

As shown in Tables 18, although the maximum modeled concentration in the form of the standard for each scenario exceeds the NAAQS, Pleasants Energy, LLC's contribution is less than the Significant Impact Limit (SIL) paired in time and space. Per Jon McClung "It has been EPA and WVDAs longstanding policy that a facility does not 'cause or contribute to' an exceedance of the NAAQS if its contribution is less than the SIL."

**Table 19**

Pollutant and Averaging Period		Maximum Modeled Concentration	Background Concentration	Total Concentration	NAAQS	Pleasants Energy Contribution	SIL
		(µg/m <sup>3</sup> )					
NO <sub>2</sub>	1-hr	141.4	68.3	209.7	188	0.019	7.5
PM <sub>2.5</sub>	24-hr	582.8	19.4	602.2	35	0.073	1.2

The last stage is usually to determine how much of the PSD Increment the proposed construction of the facility consumes, along with all other increment consuming sources. This value may not exceed the PSD Increment. PSD Increments are the maximum concentration increases above a baseline concentration that are allowed. However, an increment for the 1 hour NO<sub>2</sub> standard has not been established. Therefore, only the 24 hour PM<sub>2.5</sub> standard was evaluated. As can be seen in Table 19, Pleasants Energy's contribution to the maximum increment exceedance, and all increment exceedances at all modeled receptors, was below the SIL.

**Table 20**

Pollutant and Averaging Period		Maximum Modeled Concentration	PSD Class II Increment	Pleasants Energy Contribution	SIL
		(µg/m <sup>3</sup> )			
PM <sub>2.5</sub>	24-hr	882.8	9	0.093	1.2

The applicant therefore passes all the required Air Quality Impact Analysis tests as required under 45CSR14. Attached to this evaluation is a report prepared by Jon McClung on September 19, 2016 that details the above analysis.

### ***Additional Impacts Analysis - 45CSR14 Section 12***

Section 12 of 45CSR14 requires an applicant to provide "an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial, and other growth associated with the source or modification." It also requires the applicant to perform "an analysis of the air quality impact projected for the area as a result of general commercial, residential,

industrial and other growth associated with the source or modification." No quantified thresholds are promulgated for comparison to the additional impacts analysis

Pleasants Energy, LLC provided an extensive Additional Impacts Analysis in the application. In their analysis, they looked at potential impacts of economic growth associated with the proposed facility, as well as potential impacts on soils, vegetation and local visibility. Additionally, as discussed above, the applicant also performed deposition and visibility modeling for Class I areas. The conclusions of their analysis are included below. Pleasants full analysis is available in the application and supplemental material submitted on March 2, 2016 and included in the file.

*"As shown by the results presented in this section of the application and additional supplemental information, the Project will not have a significant adverse impact on the air quality, soils, vegetation, visibility and or growth in the surrounding area."*

#### **Minor Source Baseline Date (Pleasants County, WV) - Section 2.42.b**

On April 18, 2016 the permit application R14-0034 was deemed complete. This action, as per 45CSR14, Section 2.42.b, has triggered the minor source baseline date (MSBD) for the following areas:

**Table 21: Minor Source Baseline Triggering**

<b>Pollutant</b>	<b>Pleasants County</b>	<b>Wood County</b>
NO <sub>2</sub>	Previously	Previously
PM <sub>10</sub>	Previously	No
PM <sub>2.5</sub>	Yes	Yes <sup>1</sup>

<sup>1</sup>Triggered because modeled impacts in Wood County exceed the SIL.

#### **TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS**

This section provides general toxicity information for those pollutants not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO<sub>x</sub>), Ozone, Particulate Matter (PM), and Sulfur Dioxide (SO<sub>2</sub>). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal and state programs designed to limit their emissions and public exposure. These programs include federal source-specific HAP limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of Hazardous Air Pollutants (HAPs). All non-criteria regulated pollutants proposed to be emitted by the facility with the exception of sulfuric acid mist (H<sub>2</sub>SO<sub>4</sub>) are defined as Hazardous Air Pollutants (HAPs). HAPS and H<sub>2</sub>SO<sub>4</sub> will be discussed separately below.

## HAPs

Section 112(b) of the Clean Air Act (CAA) identifies 188 compounds as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. The combustion of both natural gas and fuel oil have the potential to produce HAPs. However, the potential HAP emissions from the facility are below the levels that define a major HAP source. Therefore, the facility is considered a minor (or area) HAP source, and no source-specific major source NESHAP or MACT standards apply. The following table lists each HAP potentially emitted by the facility in excess of 20 pounds/year (0.01 tons/year) and the carcinogenic risk associated thereto (as based on analysis provided in the Integrated Risk Information System (IRIS)):

**Table 22: Potential HAP Carcinogenic Risk**

HAPs	Type	Known/Suspected Carcinogen	Classification
Acetaldehyde	VOC	Yes	B2 - Probable Human Carcinogen
Acrolein	VOC	No	Not Assessed
Benzene	VOC	Yes	A - Human Carcinogen
Ethylbenzene	VOC	No	D-Not Classifiable
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen
Hexane	VOC	No	Inadequate Data
Naphthalene	VOC	Yes	C-Possible Human Carcinogen
PAHs <sup>1</sup>	VOC	Yes	B2 - Probable Human Carcinogen
Toluene	VOC	No	Inadequate Data
Xylene	VOC	No	Inadequate Data
2,2,4-Trimethylpentane	VOC	No	Not Classified
Biphenyl	VOC	No	D-Not Classifiable
1,3-Butadiene	VOC	Yes	Carcinogenic by Inhalation
Methanol	VOC	No	Not Classified
Manganese	PM	No	D-Not Classifiable

<sup>1</sup>Polycyclic Aromatic Hydrocarbons (PAHs) defines a broad class of compounds some of which include compounds classified as B2-probable human carcinogens.

All HAPs also have other non-carcinogenic chronic and acute effects. These adverse health effects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, there are no federal or state ambient air quality standards for these specific chemicals. The regulatory applicability of any potential NESHAP or MACT to the Pleasants Energy, LLC Plant was discussed above. For a complete discussion of the known health effects refer to the IRIS database located at [www.epa.gov/iris](http://www.epa.gov/iris).

### ***Sulfuric Acid Mist ( $H_2SO_4$ )***

The compound of  $H_2SO_4$  is regulated under 45CSR14 with a significance level that can trigger BACT for each source that contributes  $H_2SO_4$  emissions. As discussed above, the potential  $H_2SO_4$  emissions from the facility did not trigger a BACT analysis for the compound.  $H_2SO_4$  is not represented in the IRIS database and is not listed as a HAP. Concerning the carcinogenicity of sulfuric acid, the Agency for Toxic Substances and Disease Registry (ATSDR) states that "[t]he ability of sulfuric acid to cause cancer in laboratory animals has not been studied. The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans. IARC has not classified pure sulfuric acid for its carcinogenic effects."

## **MONITORING, REPORTING, AND RECORD-KEEPING OF OPERATIONS**

### ***Emissions Monitoring***

The primary purpose of emissions monitoring is to guarantee the permittee's compliance with emission limits and operating restrictions in the permit on a continuous basis. Emissions monitoring may include any or all of the following:

- \* Real-time continuous emissions monitoring to sample and record pollutant emissions (CEMS, COMS);
- \* Parametric monitoring of variables used to determine potential emissions (recording of material throughput, fuel usage, production, etc.);
- \* Monitoring of control device performance indicators (pressure drops, catalyst injection rates, etc.) to guarantee efficacy of pollution control equipment;
- \* Visual stack observations to monitor opacity.

- \* It is the permittee's responsibility to record, certify, and report the monitoring results so as to verify compliance with the emission limits. Specific emissions monitoring requirements for each emissions unit at the Pleasants Energy, LLC facility are discussed below.

Pleasants Energy, LLC shall be required to show continuous compliance with the turbine emission limits by using the monitoring specified in the following table:

**Table 23**

Pollutant	Monitoring Method	Permit/Rule Citation	Comment
CO	Initial stack test + fuel usage+records of start ups and shutdowns	Permit	Method 10 or 10B
NO <sub>x</sub>	CEMS	40 CFR 75	Pursuant to §75.10
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	Initial stack test, fuel usage	Permit	Method 5 & Method 202 or other as approved
SO <sub>2</sub>	Fuel usage + fuel sulfur content	Subpart GG	Fuel S content Pursuant §60.334(h)(1)
VOCs	Initial stack test, fuel usage	Permit	Method 18 or 25 as approved or other as approved
Lead	Fuel usage	Permit	
H <sub>2</sub> SO <sub>4</sub>	Fuel usage + fuel sulfur content	Permit	Fuel S content Pursuant to §60.334
GHGs	Initial stack test + fuel usage	Permit	Method 3A or 3C as approved for CO <sub>2</sub> . Calcs for non CO <sub>2</sub> GHGs.
HAPs	Fuel usage	Permit	
Opacity	Monthly VE readings	Permit	Method 22

The CEMS will provide a continuous and real-time method of determining compliance with the emission limits specified in the permit. The CEMS will be installed and operated according to the applicable provisions of 40 CFR 60. Parametric monitoring will also be used to show compliance with emissions limits. This will include monitoring fuel combusted in the turbines and sampling the fuel to determine its constituent characteristics.

### **Record-Keeping**

Pleasants Energy, LLC will be required to follow the standard record-keeping boilerplate in the permit. This will require them to maintain records of all data monitored in the permit and keep the information for five years. All collected data will be available to the Director upon request. Pleasants Energy, LLC will also be required to follow all the record-keeping requirements as applicable in the 40 CFR 60 Subpart GG. The existing natural gas fired and fuel oil fired engines shall continue to follow the record-keeping requirements of 40 CFR 60 Subparts IIII and JJJJ and 40 CFR 63 Subpart ZZZZ.

## Reporting

Pleasants Energy, LLC will also be required to follow all the reporting requirements as applicable in the 40 CFR 60 Subpart GG for the turbine. The existing natural gas fired and fuel oil fired engines shall continue to follow the reporting requirements of 40 CFR 60 Subparts IIII and JJJJ and 40 CFR 63 Subpart ZZZZ.

## PERFORMANCE TESTING

Performance testing is required to verify the emission factors used to determine the units' potential-to-emit and show compliance with permitted emission limits. Performance testing must be conducted in accordance with accepted test methods and according to a protocol approved by the Director prior to testing. All units subject to a standard under 40 CFR 60 are required to perform an initial performance test according to the applicable Subpart. Periodic testing may be required thereafter depending on the specifics of the emissions unit in question. Under the WV SIP, testing is required at the discretion of the Director.

Initial and periodic testing is required on each turbine stack to determine compliance with the following emission limits using the noted test methods:

**Table 24: Turbine Testing Requirements**

Pollutant	Test Method <sup>(1)</sup>
CO	Method 10B
NO <sub>x</sub> <sup>(2)</sup>	Method 19
PM	Method 202
PM (filterable only)	Method 5
PM <sub>10</sub> /PM <sub>2.5</sub>	Method 202
VOCs	Method 18
H <sub>2</sub> SO <sub>4</sub>	Method 8
Opacity	Method 22

(1) All test methods refer to those given under 40 CFR 60, Appendix A

(2) Data obtained during required RATA testing of the NO<sub>x</sub> CEMs may be used in lieu of the required testing.

Performance testing after the initial test will be required on a schedule set forth in the permit. The permittee shall also be required to test and verify initial compliance with BACT limits in the permit for the turbines and thereafter on a schedule set forth in the permit.

### ***Black Start Generator/TurboPhase Engines***

Performance testing for black start generators and TurboPhase engines are limited to those required under 40 CFR 60, Subparts IIII and JJJJ.

### **RECOMMENDATION TO DIRECTOR**

The WVDAQ has preliminarily determined that the modification of the Pleasants Energy, LLC, natural gas fired power plant near Waverly, but In Pleasants County will meet the emission limitations and conditions set forth in the DRAFT permit and will comply with all current applicable state and federal air quality rules and standards including 45CSR14, the WV Legislative Rule implementing the Prevention of Significant Deterioration program. A final decision regarding the DRAFT permit will be made after consideration of all public comments. It is the recommendation of the undersigned, upon review and approval of this document and the DRAFT permit, that the WVDAQ, pursuant to §45-14-17, go to public notice on permit application R14-0034.

Steven R. Pursley, PE  
Engineer

September 26, 2016

*Sign it*



**R14-0034  
Pleasants Energy, LLC  
Waverly Power Plant**

**Attachment A: Modeling Analyses**

## MEMO

**To:** Steve Pursley  
**From:** Jon McClung *JDM*  
**CC:** Laura Crowder, Bev McKeone, Joe Kessler, Ed Andrews  
**Date:** September 19, 2016  
**Re:** Pleasants Energy, LLC Modeling Review - PSD Application R14-0034

---

I have completed my review and replication of the air dispersion modeling analysis submitted in support of the PSD permit application (R14-0034) for the proposed modification of the Pleasants Energy, LLC (Pleasants Energy) facility located near Waverly, West Virginia, within Pleasants County. This dispersion modeling analysis is required pursuant to §45-14-9 (Requirements Relating to the Source's Impact on Air Quality).

As part of the review process, an applicant for a PSD permit performs the air quality impact analysis and submits the results to the Division of Air Quality (DAQ). The DAQ then reviews and replicates the modeling runs to confirm the modeling inputs, procedures, and results. This memo contains a synopsis of the modeling analysis. For a complete technical description of the modeling analysis, please consult the protocol and modeling analysis report submitted by the applicant.

Pleasants Energy installed two simple-cycle General Electric (GE) 7FA combustion turbines at the Pleasants Energy facility in 2001, under Permit R13-2373, with an administrative amendment in 2006 (R13-2373A). The permit had operational restrictions to limit the facility's potential to emit to less than 250 tons per year (tpy) of any criteria pollutant so the facility could be minor for PSD. In this PSD permit application (R14-0034), Pleasants Energy proposes to modify the facility by increasing the operating time of the combustion turbines. The existing Pleasants Energy facility includes two TurboPhase units that consist of four engines each and five Tier IV diesel generators.

### **Class I Area Analysis**

The Federal Land Managers responsible for evaluating effects on Air Quality Related Values (AQRVs) for federally protected Class I areas were consulted and required modeling analyses specific to Class I areas for the proposed project. CALPUFF was used to model the visibility and deposition effects on the Class I areas of Otter Creek Wilderness and Dolly Sods Wilderness in West Virginia and Shenandoah National Park and James River Face Wilderness in Virginia. A Class I increment analysis was also completed. The CALPUFF modeling results indicate that the project is not expected to have any noticeable effect on visibility and is not expected to have adverse impacts resulting from deposition. In addition, CALPUFF was used to demonstrate that the impacts from the project will be below Class I significant impact levels (SIL) for the Class I areas. Tables 1 and 2 contain the results of the Class I significance modeling. No further modeling is required for the Class I areas. Attachment 1 contains the determinations by the

Federal Land Managers of no significant impacts to any AQRVs at Class I areas. The complete results of this analysis are contained in the Class I modeling report submitted by the applicant.

**Table 1. Screening Modeled (AERMOD) Impacts and Class I Area Significant Impact Level<sup>a</sup>**

Pollutant	Averaging Period	Maximum Modeled value at 50 kilometer receptor ( $\mu\text{g}/\text{m}^3$ )				Class I Significant Impact Level ( $\mu\text{g}/\text{m}^3$ )
		Otter Creek Wilderness	Dolly Sods Wilderness	Shenandoah National Park	James River Face Wilderness	
PM <sub>10</sub>	24-hour	0.0972	0.0499	0.0526	0.0733	0.3
	Annual	0.0036	0.0018	0.0018	0.0020	0.2
PM <sub>2.5</sub>	24-hour	<b>0.0972</b>	0.0499	0.0526	<b>0.0733</b>	0.07
	Annual	0.0036	0.0018	0.0018	0.0020	0.06
NO <sub>2</sub>	Annual	0.0139	0.0071	0.0071	0.0078	0.1

<sup>a</sup>Bold indicates modeled value exceeds SIL

**Table 2. PM<sub>2.5</sub> 24-hour Modeled (CALPUFF) Impacts and Class I Area Significant Impact Level**

Maximum Modeled value ( $\mu\text{g}/\text{m}^3$ )		Class I Significant Impact Level ( $\mu\text{g}/\text{m}^3$ )
Otter Creek Wilderness	James River Face Wilderness	
0.0401	0.0146	0.07

#### Class II Area Analysis

Pleasants County, WV is in attainment or unclassifiable/attainment status for all criteria pollutants. Project emissions of SO<sub>2</sub> are below the significant emission rate (SER), therefore SO<sub>2</sub> is not subject to PSD review. Pollutants emitted in excess of the SER are subject to PSD review in areas of attainment. The criteria pollutants that exceed the SER associated with the proposed facility are in Table 3 (highlighted in bold).

**Table 3. Project emission rates**

Pollutant	Project Emissions (tons/yr)	Significant Emission Rate (tons/yr)
NO <sub>x</sub>	<b>464.6</b>	<b>40</b>

Pollutant	Project Emissions (tons/yr)	Significant Emission Rate (tons/yr)
CO	509.5	100
SO <sub>2</sub>	39	40
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	118.7	25/15/10
VOC	23.8	40
GHG (CO <sub>2</sub> e)	1,231,633	75,000

Dispersion modeling was conducted for NO<sub>x</sub>, CO, PM<sub>10</sub>, and PM<sub>2.5</sub>. Greenhouse gases (GHG) are not modeled as part the PSD application review process and VOC emissions as a precursor to tropospheric ozone formation were addressed through a qualitative analysis by the applicant in the modeling protocol. Modeled emission rates and stack parameters are included Tables 4 and 5.

**Table 4. Combustion Turbine Emissions and Modeling Parameters - Natural Gas Operation (per Turbine)**

Pollutant	100% Load with TurboPhase	100% Load	80% Load	Start-up/Shut down
	pounds per hour (lb/hr)			
NO <sub>x</sub>	75 (53 <sup>a</sup> )	65 (53 <sup>a</sup> )	54 (53 <sup>a</sup> )	121.2 (53 <sup>a</sup> )
CO	36	32	26	384.4
PM <sub>10</sub>	20.2 (11.54 <sup>a</sup> )	18 (11.54 <sup>a</sup> )	18 (11.54 <sup>a</sup> )	18 (11.54 <sup>a</sup> )
PM <sub>2.5</sub>	20.2 (11.54 <sup>a</sup> )	18 (11.54 <sup>a</sup> )	18 (11.54 <sup>a</sup> )	18 (11.54 <sup>a</sup> )
Stack Parameters				
Stack temperature (°F)	1,131	1,131	1,097	1,097
Exit velocity (ft/s)	166.6	148.2	139.6	139.6
Stack height (feet)	114.5	114.5	114.5	114.5
Stack diameter (feet)	18	18	18	18

<sup>(a)</sup>Maximum annualized emissions.

**Table 5. Combustion Turbine Emissions and Modeling Parameters - Fuel Oil Operation (per Turbine)**

Pollutant	100% Load	80% Load	Start-up/Shut down
	pounds per hour (lb/hr)		
NO <sub>x</sub>	53 <sup>a</sup>	53 <sup>a</sup>	53 <sup>a</sup>
CO	72	53	230.4
PM <sub>10</sub>	39 (11.54 <sup>a</sup> )	39 (11.54 <sup>a</sup> )	39 (11.54 <sup>a</sup> )
PM <sub>2.5</sub>	39 (11.54 <sup>a</sup> )	39 (11.54 <sup>a</sup> )	39 (11.54 <sup>a</sup> )
<b>Stack Parameters</b>			
Stack temperature (°F)	1,131	1,158	1,158
Exit velocity (ft/s)	148.2	141.7	141.7
Stack height (feet)	114.5	114.5	114.5
Stack diameter (feet)	18	18	18

<sup>(a)</sup>Maximum annualized emissions.

Table 6 presents a summary of the air quality standards that were addressed for NO<sub>2</sub>, CO, PM<sub>10</sub>, and PM<sub>2.5</sub>. The pollutants, averaging times, increments, significant impact levels (SILs) and National Ambient Air Quality Standards (NAAQS) are listed. The SIL for 1-hour NO<sub>2</sub> represents the value the Division of Air Quality has implemented as described in the memorandum included in Attachment 2.

**Table 6. Ambient Air Quality Standards, SILs, and PSD Increments**

Pollutant	Averaging Period	SIL	PSD Increments	NAAQS
		µg/m <sup>3</sup>		
NO <sub>2</sub>	1-Hour	7.5	-	188

Pollutant	Averaging Period	SIL	PSD Increments	NAAQS
			$\mu\text{g}/\text{m}^3$	
NO <sub>2</sub>	Annual	1	25	100
PM <sub>10</sub>	24-Hour	5	30	150
	Annual	1	17	-
PM <sub>2.5</sub>	24-Hour	1.2	9	35
	Annual	0.3	4	12
CO	1-Hour	2000	-	40,000
	8-Hour	500	-	10,000

An air quality impact analysis, as a part of the PSD review process, is a two tiered process. First, a proposed facility is modeled by itself, on a pollutant-by-pollutant and averaging-time basis, to determine if ambient air concentrations predicted by the model exceed the significant impact level (SIL). If ambient impacts are below the SIL then the proposed source is deemed to not have a significant impact and no further modeling is required. If ambient impacts exceed the SIL then the modeling analysis proceeds to the second tier of cumulative modeling. The cumulative modeling analysis consists of modeling the proposed facility with existing off-site sources and adding representative background concentrations and comparing the results to PSD increments (increment consuming and expanding sources only) and NAAQS. In order to receive a PSD permit, the proposed source must not cause or contribute to an exceedance of the NAAQS or PSD increments. In cases where the PSD increments or NAAQS are predicted to be exceeded in the cumulative analysis, the proposed source would not be considered to cause or contribute to the exceedance if the project-only impacts are less than the SIL.

On January 22, 2013, the U.S. Court of Appeals for the District of Columbia Circuit vacated two provisions in EPA's PSD regulations containing SILs for PM<sub>2.5</sub>. The court granted the EPA's request to remand and vacate the SIL provisions in Sections 51.166(k)(2) and 52.21(k)(2) of the regulations so that EPA could address corrections. EPA's position remains that the court decision does not preclude the use of SILs for PM<sub>2.5</sub> but special care should be taken in applying the SILs for PM<sub>2.5</sub>. This special care involves ensuring that the difference between the NAAQS and the representative measured background concentration is greater than the SIL. If this difference is greater than the SIL, then it is appropriate to use the SIL as a screening tool to inform the decision as to whether to require a cumulative air quality impact analysis. As shown in Table 7, for both the 24-hr and annual averaging time for PM<sub>2.5</sub>, this difference is greater than the SIL and it is appropriate to use the SIL as a screening tool. Included in Attachment 3 are the Final, Certified West Virginia PM<sub>2.5</sub> Design Values.

**Table 7.  $PM_{2.5}$  NAAQS, Monitor Design Values, and Significant Impact Levels**

PM <sub>2.5</sub> Averaging Period	NAAQS	Vienna Monitor Design Value (54-107- 1002)	Difference between NAAQS and Monitored Value	Significant Impact Level (SIL)
		2013-2015		
	µg/m <sup>3</sup>			
24-hr	35	21	14	1.2
Annual	12	9.4	2.6	0.3

**Modeling Basis**

The modeling system used conforms to 40 CFR 51 Appendix W, applicable guidance, and the approved protocol and is summarized below:

- The latest version of AERMOD available was used (version 15181) in default mode, except as noted below. The AERMOD modeling system (AERMOD, AERMET, AERMAP) is the regulatory default modeling system for near-field (<50km) regulatory dispersion modeling.
- AERMET (version 14134) was used to process five years of surface meteorological data from the Parkersburg Wood County Airport (Station ID 03804). Upper air and data from Wilmington Airborne Park, Ohio (Station ID 13841) were used.
- The latest version of AERSURFACE (13016) was used to develop appropriate surface characteristic (albedo, bowen ratio, surface roughness) inputs to AERMET.
- A nested receptor grid was developed and AERMAP was used to determine terrain heights and hill height scales for use by AERMOD.
- The U.S. EPA Tier III NO<sub>x</sub> to NO<sub>2</sub> conversion non-default Ozone Limiting Method (OLM) was used to demonstrate compliance with the 1-hr NO<sub>2</sub> NAAQS. The Division of Air Quality obtained alternative-model status approval from EPA Region III on April 8, 2016 (Attachment 4). Background ozone data for OLM were obtained from the Vienna, WV monitor (50-107-1002) for the ozone season and non-ozone season data was obtained from the Quaker City, Ohio monitor (39-121-9991) and the Lawrenceville monitor in Pittsburgh, PA (43-003-0008).
- Background NO<sub>2</sub> monitoring data for the cumulative analysis for 1-hr NO<sub>2</sub> were obtained from a monitor in Washington County, PA (ID # 41-125-0005). Consistent with EPA guidance, background data represents the multiyear (2012, 2013, and 2014) average of the 98<sup>th</sup> percentile. Background 24-hour PM<sub>2.5</sub> monitoring data was obtained from the Vienna, WV monitor (54-107-1002) and the 98<sup>th</sup> percentile averaged over year 2012 to 2014 was used.
- The U.S. EPA Building Profile Input Program (BPIP), Version 04274 with PRIME, was used to calculate downwash effects for the project emissions sources.

- AERMOD was used to model direct emissions of PM<sub>2.5</sub>. Secondary formation of PM<sub>2.5</sub> resulting from precursor emissions of NO<sub>x</sub> was addressed qualitatively by the applicant in the modeling protocol.

### **Modeling Operating Scenarios**

#### ***Combustion Turbines***

The project sources subject to PSD review are the two GE combustion turbines installed in 2001. All modeling scenarios were modeled for each hour of the five-year meteorological record, except as noted below. The combustion turbines will emit pollutants at varying rates depending on the operating load of the turbine, fuel type, and TurboPhase usage. The operating load of the turbines will affect the stack gas parameters of temperature and velocity, which will in turn affect dispersion and ambient concentrations predicted by the model. A load analysis is required by Appendix W of 40 CFR 51, as referenced in §45-14-10 (Modeling Requirements) to ensure that worst case ambient concentrations are identified in the modeling analysis. Pleasants Energy analyzed load-varying scenarios for operation while combusting natural gas and fuel oil. The natural gas operating scenarios include 100% load with TurboPhase, 100% load, 80% load, 60% load and start-up/shutdown. The fuel oil operating scenarios include 100% load, 80% load, 60% load and start-up/shutdown. The natural gas and fuel oil scenarios were modeled for PM<sub>2.5</sub> (24-hr and annual), NO<sub>2</sub> (annual), and CO (1-hr and 8-hr). The natural gas scenarios were modeled for 1-hr NO<sub>2</sub>.

The combustion turbine back-up fuel oil operation will only be used in emergency situations when natural gas is curtailed and for testing purposes. Fuel oil operation start-up is limited to a maximum of 20 start-ups per year. The approved modeling protocol excludes the fuel oil operation scenarios from the modeling analysis for 1-hr NO<sub>2</sub> since, consistent with EPA modeling guidance, the intermittent nature of the fuel oil scenarios (20 startups per year, emergency operation only) is not continuous enough or frequent enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations.

#### ***Non-project Pleasants Energy sources***

The existing sources at Pleasants Energy not subject to PSD review include two TurboPhase units that consist of four engines each and five Tier IV diesel generators. The existing Pleasants Energy sources were modeled in the cumulative scenarios as non-PSD-project inventory sources for 1-hr NO<sub>2</sub> and 24-hr PM<sub>2.5</sub>. The two TurboPhase units were modeled simultaneously for the entire meteorological record. Two of the five Tier IV diesel generators were modeled simultaneously for the entire meteorological record. Pleasants Energy is proposing to operate only two of the five diesel generators at any time.



### **SIL Analysis Results (Tier I)**

The results of the Significant Impact Analysis for the Pleasants Energy project sources are included in Table 8. The results represent continuous operation of both turbines simultaneously for 8760 hour/year and are the highest first-highest concentration. For all pollutants and averaging times, the maximum modeled concentration is below the significant impact level except for 1-hr NO<sub>2</sub> and 24-hr PM<sub>2.5</sub>. Therefore, further modeling analysis is necessary for 1-hr NO<sub>2</sub> and 24-hr PM<sub>2.5</sub>.

**Table 8. SIL Analysis Results**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>Year</b>	<b>Maximum Modeled Concentration (µg/m<sup>3</sup>)</b>	<b>Significant Impact Level (SIL) (µg/m<sup>3</sup>)</b>
NO <sub>2</sub>	Annual	2012	0.1	1
	1-hour	5 years	45.7	7.5
CO	1-hour	2012	174.3	2000
	8-hour	2013	80.0	500
PM <sub>10</sub>	Annual	2012	0.03	1
	24-hour	2014	2.8	5
PM <sub>2.5</sub>	Annual	5 years	0.02	0.3
	24-hour	5 years	2.1	1.2

### **Cumulative Analysis Results (Tier II)**

The results of the Cumulative Impact Analysis for the 24-hr PM<sub>2.5</sub> NAAQS of 35 µg/m<sup>3</sup> and the 1-hr NO<sub>2</sub> NAAQS of 188 µg/m<sup>3</sup> are included in Table 7. This analysis includes impacts from the Pleasants Energy Project sources, Pleasants Energy non-PSD-project existing sources, off-site existing sources, and representative background concentrations of NO<sub>2</sub> and PM<sub>2.5</sub>. For the Pleasants Energy project sources, the results represent continuous operation of both turbines simultaneously for 8760 hour/year. The modeling conditions for the Pleasants Energy non-PSD-project sources are as described above. For off-site existing sources, the impacts represent maximum hourly potential emissions, as determined from Title V permits and applications obtained from the WV Division of Air Quality and for Ohio sources, from the Ohio EPA. The background concentration data is summarized above with detailed information in the applicant's modeling report.

The cumulative analysis evaluated impacts at all receptors above the SIL in the SIL analysis. The SIL analysis is based on the highest first-highest concentration. The cumulative analysis is based on the form of the 1-hr NO<sub>2</sub> standard, which is the 98<sup>th</sup> percentile of the yearly distribution of 1-hour daily maximum concentrations, which is equivalent to the 8<sup>th</sup> highest rank of daily maximum concentrations. The output options from AERMOD allow the determination of contribution of all sources to modeled concentrations. These options were used to determine Pleasants Energy's contribution to the total modeled concentration at all modeled receptors for all hours in the meteorological record.

Table 9 shows the maximum modeled concentrations for all the receptors modeled in the cumulative analysis for all operating scenarios. Modeled exceedances of the NAAQS are predicted and Pleasants Energy's contribution is less than the SIL, paired in time and space. EPA's and DAQ's longstanding use of the SIL as a permitting tool is that a facility does not cause or contribute to an exceedance of the NAAQS if it's contribution is less than the SIL and may still receive a permit as long as all other criteria are met. For all modeled exceedances of the NAAQS, Pleasants Energy's contribution is below the SIL for both 1-hr NO<sub>2</sub> and 24-hr PM<sub>2.5</sub>.

**Table 9. NO<sub>2</sub> and PM<sub>2.5</sub> NAAQS Analysis Results - Maximum Modeled Concentrations**

Pollutant and Averaging Period		Maximum Modeled Con- centration	Background Con- centration	Total Con- centration	NAAQS	Pleasants Energy Contribution	SIL
		(µg/m <sup>3</sup> )					
NO <sub>2</sub>	1-hr	141.4	68.3	209.7	188	0.019	7.5
PM <sub>2.5</sub>	24-hr	582.8	19.4	602.2	35	0.073	1.2

Table 10 shows the maximum modeled PM<sub>2.5</sub> Class II Increment concentration. Pleasants Energy's contribution to the maximum increment exceedance, and all increment exceedances at all modeled receptors, remains below the SIL. An increment analysis was not performed for 1-hr NO<sub>2</sub> since an increment level has not been established.

**Table 10.  $PM_{2.5}$  Class II Increment Analysis Results**

Pollutant and Averaging Period		Maximum Modeled Concentration	PSD Class II Increment	Pleasants Energy Contribution	SIL
		$(\mu\text{g}/\text{m}^3)$			
$PM_{2.5}$	24-hr	882.8	9	0.093	1.2

**Summary**

The air quality impact analysis prepared and submitted by Pleasants Energy to the DAQ has been reviewed and replicated and conforms to 40 CFR 51 Appendix W, applicable guidance, and the modeling protocol. The analysis demonstrates that the proposed facility operations will have modeled impacts less than the SILs for all pollutants and averaging times except for 1-hr  $NO_2$  and 24-hr  $PM_{2.5}$ . The cumulative modeling analysis demonstrates that Pleasants Energy's contribution to the modeled NAAQS exceedances for 1-hr  $NO_2$  and 24-hr  $PM_{2.5}$ . Modeled exceedances for 24-hr Class II  $PM_{2.5}$  increment are less than the SIL, therefore Pleasants Energy does not cause or contribute to the modeled exceedances.

# Permit to Modify



**R14-0034**

*This permit is issued in accordance with the West Virginia Air Pollution Control Act (West Virginia Code §§ 22-5-1 et seq.) and 45 C.S.R. 13 — Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation. The permittee identified at the facility listed below is authorized to construct the stationary sources of air pollutants identified herein in accordance with all terms and conditions of this permit.*

Issued to:  
**Pleasants Energy, LLC**  
**Waverly Power Plant**  
**073-00022**

---

*William F. Durham*  
*Director*

*Issued: DRAFT*

This permit will supercede and replace Permit R13-2373B.

Facility Location: Waverly, Pleasants County, West Virginia

Mailing Address: 10319 South Pleasants Highway  
St. Marys, WV 26170

Facility Description: Electric Generating Peaking Station

NAICS Codes: 221112

UTM Coordinates: 468.63 km Easting • 4,353.57 km Northing • Zone 17

Permit Type: PSD Major Modification

Description of Change:

Permit to relax limits which were originally imposed to keep the source a synthetic minor for PSD. Therefore, the facility must undergo retroactive PSD review.

*Any person whose interest may be affected, including, but not necessarily limited to, the applicant and any person who participated in the public comment process, by a permit issued, modified or denied by the Secretary may appeal such action of the Secretary to the Air Quality Board pursuant to article one [§§ 22B-1-1 et seq.], Chapter 22B of the Code of West Virginia. West Virginia Code §22-5-14.*

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*The source is subject to 45CSR30. Changes authorized by this permit must also be incorporated into the facility's Title V operating permit. Commencement of the operations authorized by this permit shall be determined by the appropriate timing limitations associated with Title V permit revisions per 45CSR30.*

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## 1.0 Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
DG1	EP3	Caterpillar C175-16 Diesel Gen.	2015	3MW	SCR
DG2	EP4	Caterpillar C175-16 Diesel Gen.	2015	3MW	SCR
DG3	EP5	Caterpillar C175-16 Diesel Gen.	2015	3MW	SCR
DG4	EP6	Caterpillar C175-16 Diesel Gen.	2015	3MW	SCR
DG5	EP7	Caterpillar C175-16 Diesel Gen.	2015	3MW	SCR
TP1A	EP8	TurboPhase Module (engine)	2016	2,750 HP	OxCat
TP1B	EP8	TurboPhase Module (engine)	2016	2,750 HP	OxCat
TP1C	EP8	TurboPhase Module (engine)	2016	2,750 HP	OxCat
TP1D	EP8	TurboPhase Module (engine)	2016	2,750 HP	OxCat
TP2A	EP9	TurboPhase Module (engine)	2016	2,750 HP	OxCat
TP2B	EP9	TurboPhase Module (engine)	2016	2,750 HP	OxCat
TP2C	EP9	TurboPhase Module (engine)	2016	2,750 HP	OxCat
TP2D	EP9	TurboPhase Module (engine)	2016	2,750 HP	OxCat
GT1	EP1	GE Model 7FA Turbine	2001	1,571 mmbtu/hr	N
GT2	EP2	GE Model 7FA Turbine	2001	1,571 mmbtu/hr	N

## 2.0. General Conditions

### 2.1. Definitions

- 2.1.1. All references to the "West Virginia Air Pollution Control Act" or the "Air Pollution Control Act" mean those provisions contained in W.Va. Code §§ 22-5-1 to 22-5-18.

- 2.1.2. The "Clean Air Act" means those provisions contained in 42 U.S.C. §§ 7401 to 7671q, and regulations promulgated thereunder.
- 2.1.3. "Secretary" means the Secretary of the Department of Environmental Protection or such other person to whom the Secretary has delegated authority or duties pursuant to W.Va. Code §§ 22-1-6 or 22-1-8 (45 CSR § 30-2.12.). The Director of the Division of Air Quality is the Secretary's designated representative for the purposes of this permit.

## 2.2. Acronyms

<b>CAAA</b>	Clean Air Act Amendments	<b>psi</b>	Pounds per Square Inch
<b>CBI</b>	Confidential Business Information	<b>SIC</b>	Standard Industrial Classification
<b>CEM</b>	Continuous Emission Monitor	<b>SIP</b>	State Implementation Plan
<b>CES</b>	Certified Emission Statement	<b>SO<sub>2</sub></b>	Sulfur Dioxide
<b>C.F.R. or CFR</b>	Code of Federal Regulations	<b>TAP</b>	Toxic Air Pollutant
<b>CO</b>	Carbon Monoxide	<b>TPY</b>	Tons per Year
<b>C.S.R. or CSR</b>	Codes of State Rules	<b>TRS</b>	Total Reduced Sulfur
<b>DAQ</b>	Division of Air Quality	<b>TSP</b>	Total Suspended Particulate
<b>DEP</b>	Department of Environmental Protection	<b>USEPA</b>	United States Environmental Protection Agency
<b>dscm</b>	Dry Standard Cubic Meter	<b>UTM</b>	Universal Transverse Mercator
<b>FOIA</b>	Freedom of Information Act	<b>VEE</b>	Visual Emissions Evaluation
<b>HAP</b>	Hazardous Air Pollutant	<b>VOC</b>	Volatile Organic Compounds
<b>HON</b>	Hazardous Organic NESHAP	<b>VOL</b>	Volatile Organic Liquids
<b>HP</b>	Horsepower		
<b>lbs/hr</b>	Pounds per Hour		
<b>LDAR</b>	Leak Detection and Repair		
<b>M</b>	Thousand		
<b>MACT</b>	Maximum Achievable Control Technology		
<b>MDHI</b>	Maximum Design Heat Input		
<b>MM</b>	Million		
<b>MMBtu/hr or mmbtu/hr</b>	Million British Thermal Units per Hour		
<b>MMCF/hr or mmcf/hr</b>	Million Cubic Feet per Hour		
<b>NA</b>	Not Applicable		
<b>NAAQS</b>	National Ambient Air Quality Standards		
<b>NESHAPS</b>	National Emissions Standards for Hazardous Air Pollutants		
<b>NO<sub>x</sub></b>	Nitrogen Oxides		
<b>NSPS</b>	New Source Performance Standards		
<b>PM</b>	Particulate Matter		
<b>PM<sub>2.5</sub></b>	Particulate Matter less than 2.5µm in diameter		
<b>PM<sub>10</sub></b>	Particulate Matter less than 10µm in diameter		
<b>Ppb</b>	Pounds per Batch		
<b>pph</b>	Pounds per Hour		
<b>ppm</b>	Parts per Million		
<b>Ppmv or ppmv</b>	Parts per million by volume		
<b>PSD</b>	Prevention of Significant Deterioration		



### **2.3. Authority**

This permit is issued in accordance with West Virginia Air Pollution Control Law W.Va. Code §§22-5-1 et seq. and the following Legislative Rules promulgated thereunder:

- 2.3.1. 45CSR13 – *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation;*
- 2.3.2. 45CSR14 – *Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration;*

### **2.4. Term and Renewal**

- 2.4.1. This permit supercedes and replaces previously issued Permit R13-2373B. This permit shall remain valid, continuous and in effect unless it is revised, suspended, revoked or otherwise changed under an applicable provision of 45CSR13 or any applicable legislative rule.

### **2.5. Duty to Comply**

- 2.5.1. The permitted facility shall be constructed and operated in accordance with the plans and specifications filed in Permit Application R13-2373, R13-2373A, R13-2373B and R14-0034 and any modifications, administrative updates, or amendments thereto. The Secretary may suspend or revoke a permit if the plans and specifications upon which the approval was based are not adhered to; [45CSR§§13-5.11 and 13-10.3]
- 2.5.2. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the West Virginia Code and the Clean Air Act and is grounds for enforcement action by the Secretary or USEPA;
- 2.5.3. Violations of any of the conditions contained in this permit, or incorporated herein by reference, may subject the permittee to civil and/or criminal penalties for each violation and further action or remedies as provided by West Virginia Code 22-5-6 and 22-5-7;
- 2.5.4. Approval of this permit does not relieve the permittee herein of the responsibility to apply for and obtain all other permits, licenses and/or approvals from other agencies; i.e., local, state and federal, which may have jurisdiction over the construction and/or operation of the source(s) and/or facility herein permitted.

### **2.6. Duty to Provide Information**

The permittee shall furnish to the Secretary within a reasonable time any information the Secretary may request in writing to determine whether cause exists for administratively updating, modifying, revoking or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Secretary copies of records to be kept by the permittee. For information claimed to be confidential, the permittee shall furnish such records to the Secretary along with a claim of confidentiality in accordance with 45CSR31. If confidential information is to be sent to USEPA, the permittee shall directly provide such information to USEPA along with a claim of confidentiality in accordance with 40 C.F.R. Part 2.

### **2.7. Duty to Supplement and Correct Information**

Upon becoming aware of a failure to submit any relevant facts or a submittal of incorrect information in any permit application, the permittee shall promptly submit to the Secretary such supplemental facts or corrected information.

## **2.8. Administrative Update**

The permittee may request an administrative update to this permit as defined in and according to the procedures specified in 45CSR13.  
[45CSR§13-4]

## **2.9. Permit Modification**

The permittee may request a minor modification to this permit as defined in and according to the procedures specified in 45CSR13.  
[45CSR§13-5.4.]

## **2.10. Major Permit Modification**

The permittee may request a major modification as defined in and according to the procedures specified in 45CSR14 or 45CSR19, as appropriate.  
[45CSR§13-5.1]

## **2.11. Inspection and Entry**

The permittee shall allow any authorized representative of the Secretary, upon the presentation of credentials and other documents as may be required by law, to perform the following:

- a. At all reasonable times (including all times in which the facility is in operation) enter upon the permittee's premises where a source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times (including all times in which the facility is in operation) any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit;
- d. Sample or monitor at reasonable times substances or parameters to determine compliance with the permit or applicable requirements or ascertain the amounts and types of air pollutants discharged.

## **2.12. Emergency**

- 2.12.1. An "emergency" means any situation arising from sudden and reasonable unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.
- 2.12.2. Effect of any emergency. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions of Section 2.12.3 are met.
- 2.12.3. The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:
  - a. An emergency occurred and that the permittee can identify the cause(s) of the emergency;

- b. The permitted facility was at the time being properly operated;
  - c. During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and,
  - d. The permittee submitted notice of the emergency to the Secretary within one (1) working day of the time when emission limitations were exceeded due to the emergency and made a request for variance, and as applicable rules provide. This notice must contain a detailed description of the emergency, any steps taken to mitigate emission, and corrective actions taken.
- 2.12.4. In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency has the burden of proof.
- 2.12.5. The provisions of this section are in addition to any emergency or upset provision contained in any applicable requirement.

### **2.13. Need to Halt or Reduce Activity Not a Defense**

It shall not be a defense for a permittee in an enforcement action that it should have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. However, nothing in this paragraph shall be construed as precluding consideration of a need to halt or reduce activity as a mitigating factor in determining penalties for noncompliance if the health, safety, or environmental impacts of halting or reducing operations would be more serious than the impacts of continued operations.

### **2.14. Suspension of Activities**

In the event the permittee should deem it necessary to suspend, for a period in excess of sixty (60) consecutive calendar days, the operations authorized by this permit, the permittee shall notify the Secretary, in writing, within two (2) calendar weeks of the passing of the sixtieth (60) day of the suspension period.

### **2.15. Property Rights**

This permit does not convey any property rights of any sort or any exclusive privilege.

### **2.16. Severability**

The provisions of this permit are severable and should any provision(s) be declared by a court of competent jurisdiction to be invalid or unenforceable, all other provisions shall remain in full force and effect.

### **2.17. Transferability**

This permit is transferable in accordance with the requirements outlined in Section 10.1 of 45CSR13. [45CSR§13-10.1]

### **2.18. Notification Requirements**

The permittee shall notify the Secretary, in writing, no later than thirty (30) calendar days after the actual startup of the operations authorized under this permit.

### **2.19. Credible Evidence**

Nothing in this permit shall alter or affect the ability of any person to establish compliance with, or a violation of, any applicable requirement through the use of credible evidence to the extent authorized by law. Nothing in this permit shall be construed to waive any defense otherwise available to the permittee including, but not limited to, any challenge to the credible evidence rule in the context of any future proceeding.

### 3.0. Facility-Wide Requirements

#### 3.1. Limitations and Standards

- 3.1.1. **Open burning.** The open burning of refuse by any person, firm, corporation, association or public agency is prohibited except as noted in 45CSR§6-3.1.  
[45CSR§6-3.1.]
- 3.1.2. **Open burning exemptions.** The exemptions listed in 45CSR§6-3.1 are subject to the following stipulation: Upon notification by the Secretary, no person shall cause, suffer, allow or permit any form of open burning during existing or predicted periods of atmospheric stagnation. Notification shall be made by such means as the Secretary may deem necessary and feasible.  
[45CSR§6-3.2.]
- 3.1.3. **Asbestos.** The permittee is responsible for thoroughly inspecting the facility, or part of the facility, prior to commencement of demolition or renovation for the presence of asbestos and complying with 40 C.F.R. § 61.145, 40 C.F.R. § 61.148, and 40 C.F.R. § 61.150. The permittee, owner, or operator must notify the Secretary at least ten (10) working days prior to the commencement of any asbestos removal on the forms prescribed by the Secretary if the permittee is subject to the notification requirements of 40 C.F.R. § 61.145(b)(3)(i). The USEPA, the Division of Waste Management and the Bureau for Public Health - Environmental Health require a copy of this notice to be sent to them.  
[40CFR§61.145(b) and 45CSR§34]
- 3.1.4. **Odor.** No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.  
[45CSR§4-3.1 State-Enforceable only.]
- 3.1.5. **Permanent shutdown.** A source which has not operated at least 500 hours in one 12-month period within the previous five (5) year time period may be considered permanently shutdown, unless such source can provide to the Secretary, with reasonable specificity, information to the contrary. All permits may be modified or revoked and/or reapplication or application for new permits may be required for any source determined to be permanently shutdown.  
[45CSR§13-10.5.]
- 3.1.6. **Standby plan for reducing emissions.** When requested by the Secretary, the permittee shall prepare standby plans for reducing the emissions of air pollutants in accordance with the objectives set forth in Tables I, II, and III of 45 C.S.R. 11.  
[45CSR§11-5.2.]

#### 3.2. Monitoring Requirements

*[Reserved]*

#### 3.3. Testing Requirements

- 3.3.1. **Stack testing.** As per provisions set forth in this permit or as otherwise required by the Secretary, in accordance with the West Virginia Code, underlying regulations, permits and orders, the permittee shall conduct test(s) to determine compliance with the emission limitations set forth in this permit and/or established or set forth in underlying documents. The Secretary, or his duly authorized representative, may at his option witness or conduct such test(s). Should the Secretary exercise his option to conduct such test(s), the operator shall provide all necessary sampling connections and sampling ports to be located in such manner as the Secretary may require, power for test equipment and the required safety equipment, such as scaffolding, railings and ladders, to comply with generally accepted good safety practices. Such tests shall be conducted in accordance with the methods and procedures set forth in this permit or as otherwise approved or specified by the Secretary in accordance with the following:

- a. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with 40 C.F.R. Parts 60, 61, and 63 in accordance with the Secretary's delegated authority and any established equivalency determination methods which are applicable. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4 or 45CSR§13-5.4 as applicable.
- b. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with applicable requirements which do not involve federal delegation. In specifying or approving such alternative testing to the test methods, the Secretary, to the extent possible, shall utilize the same equivalency criteria as would be used in approving such changes under Section 3.3.1.a. of this permit. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4 or 45CSR§13-5.4 as applicable.
- c. All periodic tests to determine mass emission limits from or air pollutant concentrations in discharge stacks and such other tests as specified in this permit shall be conducted in accordance with an approved test protocol. Unless previously approved, such protocols shall be submitted to the Secretary in writing at least thirty (30) days prior to any testing and shall contain the information set forth by the Secretary. In addition, the permittee shall notify the Secretary at least fifteen (15) days prior to any testing so the Secretary may have the opportunity to observe such tests. This notification shall include the actual date and time during which the test will be conducted and, if appropriate, verification that the tests will fully conform to a referenced protocol previously approved by the Secretary.
- d. The permittee shall submit a report of the results of the stack test within sixty (60) days of completion of the test. The test report shall provide the information necessary to document the objectives of the test and to determine whether proper procedures were used to accomplish these objectives. The report shall include the following: the certification described in paragraph 3.5.1.; a statement of compliance status, also signed by a responsible official; and, a summary of conditions which form the basis for the compliance status evaluation. The summary of conditions shall include the following:
  1. The permit or rule evaluated, with the citation number and language;
  2. The result of the test for each permit or rule condition; and,
  3. A statement of compliance or noncompliance with each permit or rule condition.

[WV Code § 22-5-4(a)(14-15) and 45CSR13]

### 3.4. Recordkeeping Requirements

- 3.4.1. **Retention of records.** The permittee shall maintain records of all information (including monitoring data, support information, reports and notifications) required by this permit recorded in a form suitable and readily available for expeditious inspection and review. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation. The files shall be maintained for at least five (5) years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. At a minimum, the most recent two (2) years of data shall be maintained on site. The remaining three (3) years of data may be maintained off site, but must remain accessible within a reasonable time. Where appropriate, the permittee may maintain records electronically (on a computer, on computer floppy disks, CDs, DVDs, or magnetic tape disks), on microfilm, or on microfiche.
- 3.4.2. **Odors.** For the purposes of 45CSR4, the permittee shall maintain a record of all odor complaints received, any investigation performed in response to such a complaint, and any responsive action(s) taken.  
[45CSR§4. State-Enforceable only.]

### 3.5. Reporting Requirements

- 3.5.1. **Responsible official.** Any application form, report, or compliance certification required by this permit to be submitted to the DAQ and/or USEPA shall contain a certification by the responsible official that states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete.
- 3.5.2. **Confidential information.** A permittee may request confidential treatment for the submission of reporting required by this permit pursuant to the limitations and procedures of W.Va. Code § 22-5-10 and 45CSR31.
- 3.5.3. **Correspondence.** All notices, requests, demands, submissions and other communications required or permitted to be made to the Secretary of DEP and/or USEPA shall be made in writing and shall be deemed to have been duly given when delivered by hand, or mailed first class with postage prepaid to the address(es) set forth below or to such other person or address as the Secretary of the Department of Environmental Protection may designate:

**If to the DAQ:**

Director  
WVDEP  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304-2345

**If to the USEPA:**

Associate Director  
Office of Air Enforcement and Compliance Assistance  
(3AP20)  
U. S. Environmental Protection Agency  
Region III  
1650 Arch Street  
Philadelphia, PA 19103-2029

#### 3.5.4. Operating Fee.

- 3.5.4.1. In accordance with 45CSR30 – Operating Permit Program, the permittee shall submit a Certified Emissions Statement (CES) and pay fees on an annual basis in accordance with the submittal requirements of the Division of Air Quality. A receipt for the appropriate fee shall be maintained on the premises for which the receipt has been issued, and shall be made immediately available for inspection by the Secretary or his/her duly authorized representative.
- 3.5.5. **Emission inventory.** At such time(s) as the Secretary may designate, the permittee herein shall prepare and submit an emission inventory for the previous year, addressing the emissions from the facility and/or process(es) authorized herein, in accordance with the emission inventory submittal requirements of the Division of Air Quality. After the initial submittal, the Secretary may, based upon the type and quantity of the pollutants emitted, establish a frequency other than on an annual basis.

## 4.0. Source-Specific Requirements

### 4.1. Limitations and Standards

- 4.1.1. Maximum Criteria Pollutant emissions from the facility shall not exceed the limits in Table 4.1.1, except that the turbine hourly limits do not include startup or shutdown. For the purpose of this permit, "startup" is defined as the time to achieve steady-state operation. Startup shall begin in the minute flame is established and shall not exceed 120 minutes (2-hour) duration per event. "Shutdown" is defined as the intent to stop operation of the unit and shall begin from steady-state operation to "no flame". Shutdown shall not exceed 60 minutes (1-hour) duration. Should any startup or shutdown be extended beyond the timelines allotted, the Permittee shall report the extension and reasons for said extension.

**Table 4.1.1**

Source <sup>1</sup>	CO		NO <sub>x</sub>		VOCs		PM/PM <sub>10</sub> /PM <sub>2.5</sub> <sup>5</sup>		SO <sub>2</sub>	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Turbines <sup>2</sup>	72.0	509.54	150.0	464.6	6.8	23.84	34.4	100.10	5.60	39.03
Turbines <sup>3</sup>	144.0		940.0		16.0		78.0		206.0	
Turbines <sup>4</sup>	64.0		130.0		6.0		30.0		5.0	
TP engines	5.34	8.66	24.26	39.4	1.46	2.36	1.60	2.60	0.08	0.12
Generators <sup>6</sup>	50.36	31.47	9.64	6.03	5.76	3.60	1.44	0.90	0.11	0.07
<b>Total</b>	<b>199.7</b>	<b>549.7</b>	<b>97.39</b>	<b>510</b>	<b>23.22</b>	<b>29.8</b>	<b>81.04</b>	<b>103.6</b>	<b>206.19</b>	<b>39.22</b>

<sup>1</sup>Two turbines combined, 8 TurboPhase engines combined and 5 generators combined.

<sup>2</sup>When firing Natural Gas and using the TurboPhase system.

<sup>3</sup>When firing Fuel Oil

<sup>4</sup>When firing Natural Gas and not using the TurboPhase system.

<sup>5</sup>Includes both filterable and condensable particulate matter

<sup>6</sup>Represents two of the five generators operating at the same time. See condition 4.1.19

- 4.1.2 The combustion turbines (combined) shall not exceed the following emissions for startups and shutdowns:

**Table 4.1.2.1: Start-Up & Shut-down Turbine Emission (natural gas operation/per turbine)**

Pollutant	Start-Up Emission Rate (lb/hr)	Shut-Down Emission Rate (lb/hr)	Total Emissions Per Event (lbs)
CO	384.4	144.4	913.2
NO <sub>x</sub>	121.2	103.3	345.7
PM	18.0	18.0	54
PM <sub>10</sub>			
PM <sub>2.5</sub>			
SO <sub>2</sub>	2.50	2.50	7.5
VOCs	6.80	6.20	19.8
GHGs	183,771	183,771	551,313
H <sub>2</sub> SO <sub>4</sub>	0.38	0.38	1.14

**Table 4.1.2.2: Start-Up & Shut-down Turbine Emission (fuel oil operation/per turbine)**

Pollutant	Start-Up Emission Rate (lb/hr)	Shut-Down Emission Rate (lb/hr)	Total Emissions Per Event (lbs)
CO	230.4	195.7	656.5
NO <sub>x</sub>	561.6	543.1	1,666.3
PM	39.0	39.0	117.0
PM <sub>10</sub>			
PM <sub>2.5</sub>			
SO <sub>2</sub>	103.0	103.0	309.0
VOCs	9.10	9.0	27.2
GHGs	255,995	255,995	767,985
Lead	0.02	0.02	0.06
H <sub>2</sub> SO <sub>4</sub>	15.8	15.8	47.4

4.1.3 Each turbine shall be limited to 365 startups and shut downs per year. Of these 365 startups and shut downs, no more than 20 shall occur when firing fuel oil. Compliance with this condition shall be based on a rolling twelve month total.

4.1.4 Maximum non criteria pollutant emissions from the facility shall not exceed the following:

Pollutant	Turbines		Generators		TurboPhase Engines		Total	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
2,2,4-Trimethylpentane	--	--	--	--	0.02	0.03	0.02	0.03
Acetaldehyde	0.13	0.39	--	--	0.57	0.92	0.70	1.31
Acrolein	0.02	0.06	--	--	0.35	0.57	0.37	0.63
Benzene	0.04	0.12	0.11	0.03	0.03	0.05	0.18	0.20
Biphenyl	--	--	--	--	0.01	0.02	0.01	0.02
1,3-Butadiene	--	--	--	--	0.02	0.03	0.02	0.03
Ethyl Benzene	0.10	0.31	--	--	--	--	0.10	0.31
Formaldehyde	0.64	2.00	0.01	0.01	3.60	5.83	4.25	7.84
Hexane	--	--	--	--	0.08	0.12	0.08	0.12
Methanol	--	--	--	--	0.17	0.28	0.17	0.28
Naphthalene	0.01	0.01	0.02	0.01	--	--	0.03	0.02
PAHs	0.01	0.02	--	--	--	--	0.01	0.02
Propylene	--	--	0.40	0.10	--	--	0.40	0.10
Toluene	0.40	1.30	0.04	0.01	0.03	0.05	0.47	1.36
Xylene	0.20	0.62	0.03	0.01	0.01	0.02	0.24	0.65



<b>Total HAPs</b>	1.55	4.83	0.61	0.16	4.89	7.94	7.05	12.92
<b>GHGs (CO<sub>2e</sub>)</b>	256,873	1,231,633	23,401	5,850	15,925	25,879	296,199	1,263,362

- 4.1.5 Combustion Turbines (GT1 and GT2) shall not combust more than  $19,082 \times 10^6$  scf/yr of natural gas cumulatively on a rolling 12 month basis. Additionally, whenever fuel oil is combusted this limit shall be reduced by 889 cubic feet of natural gas for each gallon of fuel oil combusted.
- 4.1.6 When low sulfur distillate fuel oil is fired, water injection shall be utilized to control NO<sub>x</sub> emissions.
- 4.1.7 A dry low NO<sub>x</sub> combustion system shall be installed, maintained, and operated so as to control NO<sub>x</sub> emissions from the combustion turbines (GT1 and GT2) when natural gas is fired.
- 4.1.8 The annual average sulfur content of the low sulfur distillate fuel shall not exceed 0.05 percent.
- 4.1.9 The annual average sulfur content of the natural gas shall not exceed 0.5 grains per 100 scf.
- 4.1.10 On and after the date of the performance test required by §60.8 is completed, every owner or operator subject to the provisions of this subpart as specified in paragraphs (b), (c) and (d) the following, except as provided in paragraphs (e), (f), (g), (h), (I), (j), (k), and (l) of this section.  
[§60.332(a)]
- 4.1.11 No owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any stationary gas turbine, any gases which contain nitrogen oxides in excess of:
- $$\text{STD} = 0.0075 * (14.4/Y) + F$$
- where:  
STD = allowable NOx emissions (percent volume at 15 percent oxygen and on a dry basis)
- Y = manufacturer's rated heat rate at manufacturers rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not to exceed 14.4 kilojoules per watt hour.
- F = NOx emission allowance for fuel-bound nitrogen as defined in paragraph (a)(3) of this section.  
[§60.332(a)(1)]
- 4.1.12 Electric utility stationary gas turbines with a heat input at peak load greater than 107.2 gigajoules per hour (100 million Btu/hour) based on the lower heating value of the fuel fired shall comply with the provisions of paragraph (a)(1) of this section.  
[§60.332(b)]
- 4.1.13 On and after the date on which the performance test required to be conducted by §60.8 is completed, every owner or operator subject of the provision of this subpart shall comply with one or the other of the following conditions:
- (a) No owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any stationary gas turbine any gases which contain sulfur dioxide in excess of 0.015 percent by volume at 15 percent oxygen and on a dry basis.
- (b) No owner or operator subject to the provisions of this subpart shall burn in any stationary gas turbine any fuel which contains sulfur in excess of 0.8 percent by weight.  
[§60.333]
- 4.1.14 Pursuant to the BACT provisions under 45CSR14, the permittee shall meet the following requirements for each combustion turbine:

Source	PSD Pollutant <sup>(1)</sup>							
	CO		NO <sub>x</sub>		PM <sub>2.5</sub> /PM <sub>10</sub> /PM <sup>(2)</sup>		GHGs	
	Limit	Tech. <sup>(3)</sup>	Limit	Tech. <sup>(3)</sup>	Limit	Tech. <sup>(3)</sup>	Limit (CO <sub>2e</sub> )	Tech. <sup>(3)</sup>
Turbines <sup>(4)</sup>	9 ppm 20 ppm	CP	9.0 ppm 42 ppm	DLNB, Water Inject	15.0 lb/hr w/o TP 17.2 lb/hr w/ TP 39 lb/hr	AF, NG, ULSD	1,297 lb/ MW-hr 1,570 lb/ MW-hr	NG, GE7FA

(1) Emission rates at loads of 60% or higher.

(2) PM emission rates are given in total particulate (filterable + condensable) matter

(3) CP=Good Combustion Practices; DLNB = Dry Low NO<sub>x</sub> Burners; AF = inlet air filtration; NG = Use of Natural Gas as a fuel; ULSD = use of Ultra Low Sulfur Diesel as a fuel; GE7FA = use of GE Frame 7FA.03 turbines.

(4) Where 2 limits exist, the upper limit is when firing natural gas and the bottom limit is when firing fuel oil.

4.1.14.1 During startup and shut down the applicant shall minimize the emissions by:

1. Operating and maintaining the turbines and associated air pollution control equipment in accordance with good combustion and air pollution control practices, safe operating practices, and protection of the facility.
2. Implementing operations and maintenance practices comprised of maintaining a high level of operation time, and minimizing (as much as practicable given the peaking nature of the facility) the frequency of startup and shutdown events.
3. Operate continuous emission monitoring system (CEMS), and other continuous monitoring systems and devices required by this permit.

4.1.15 Each TurboPhase engine (TP1A-1D, TP2A-2D) shall not operate more than 3,250 hours per year. Compliance with this condition shall be based on a rolling 12 month total. A rolling 12 month total shall be the sum of the operating hours for the previous twelve calendar months.

4.1.16 Each TurboPhase engine shall fire only pipeline quality natural gas with a sulfur content of no more than 0.5 grains per 100 scf.

4.1.17 Emissions from each TurboPhase engine (TP1A-1D, TP2A-2D) shall not exceed the following:

NO <sub>x</sub>	CO	VOCs
1.0 g/hp-hr	2.0 g/hp-hr	0.7 g/hp-hr

[40 CFR §60.4233(e)]

4.1.18 The permittee shall keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the TurboPhase engines in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

[40 CFR §60.4243(b)(2)(ii)]

4.1.19 Each Caterpillar C175-16 Diesel Generator (DG1-DG5) shall not operate more than 500 hours per year. Additionally, no more than two of the five generators may operate at the same time. Compliance with this condition shall be based on a rolling 12 month total. A rolling 12 month total shall be the sum of the operating hours for the previous twelve calendar months.

4.1.20 Emissions from each Caterpillar C175-16 Diesel Generator (DG1-DG5) shall not exceed the following (g/hp-hr):

NO <sub>x</sub>	CO	PM	NMHC
0.50	2.61	0.07	0.30

- 4.1.21 The permittee shall meet the requirements of 40 CFR 63 Subpart ZZZZ by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines.  
[40 CFR §63.6590(c)(1)]
- 4.1.22 The emergency generator shall fire only ultra low sulfur diesel fuel with a sulfur content of no greater than 0.0015% by weight.
- 4.1.23. **Operation and Maintenance of Air Pollution Control Equipment.** The permittee shall, to the extent practicable, install, maintain, and operate all pollution control equipment listed in Section 1.0 and associated monitoring equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions, or comply with any more stringent limits set forth in this permit or as set forth by any State rule, Federal regulation, or alternative control plan approved by the Secretary.  
[45CSR§13-5.11.]

## 4.2. Monitoring Requirements

- 4.2.1. For the purposes of determining compliance with maximum combustion limit set forth in 4.1.5, the applicant shall maintain certified daily records of the amount of natural gas and/or fuel oil combusted. Such records shall be retained by the permittee for at least five (5) years. Certified records shall be made available to the Director or his duly authorized representative upon request.
- 4.2.2 For the purposes of determining compliance with the 4.1.8, 4.1.9, 4.1.16 and 4.1.22 the permittee shall use the following fuel monitoring program:

### 4.2.2.1 Natural Gas

Sulfur monitoring shall be conducted twice monthly for six months. If this monitoring shows little variability in fuel sulfur content, and indicates consistent compliance with 40 CFR 60.333, then sulfur monitoring shall be conducted once per quarter for six quarters. If the sulfur content still shows little variability and consistent compliance with sulfur dioxide limits in 40 CFR 60.333, sampling shall be conducted twice per annum thereafter during the first and third quarters. Analysis for the fuel sulfur content of natural gas shall be conducted using one of the approved ASTM methods referenced in 40 CFR 60.333 or approved alternative.

### 4.2.2.2 Fuel Oil

The permittee shall test the No. 2 distillate fuel oil for sulfur and nitrogen content on each occasion that fuel is transferred (as referenced below) to the storage tank, from any other source. Fuel oil sulfur content shall be determined using ASTM D2880-78 or another approved ASTM method incorporated in 40 CFR 60 by reference. Fuel oil nitrogen content shall be determined by following current ASTM procedures approved by the Administrator of the EPA. Initial test methods and changes to test methods used by the permittee to determine sulfur and nitrogen content shall be submitted to and approved by the WVDEP.

- (a) Fuel oil transport/shipment is defined for sampling purposes as a series of truck transport loads from one specific fuel oil tank belonging to a vendor.
- (b) Upon receipt of delivered fuel oil, the receiving tank(s) at the facility will be sampled for fuel bound nitrogen and sulfur content prior to combustion.
- (c) If no deliveries of fuel oil have been recorded at the Facility prior to the last time fuel oil was combusted no additional sampling and analysis will be conducted and the last analysis will be utilized.
- (d) If fuel oil is delivered while oil is being combusted, the fuel oil to the combustor will be

sampled after delivery of the last tanker truck from either one specific fuel oil tank belonging to the vendor or vendor certification that all deliveries were from same fuel oil source.

- 4.2.3 In order to determine compliance with 4.1.15 the permittee shall monitor and record the hours of operation of each TurboPhase engine (TP1A-TP1D and TP2A-TP2D) on a daily basis.
- 4.2.4 In order to determine compliance with 4.1.19 the permittee shall monitor and record the hours of operation of each Caterpillar C175-16 Diesel Generator (DG1-DG5) on a daily basis.
- 4.2.5 In order to determine compliance with the combustion turbine NO<sub>x</sub> limits of condition 4.1.1 and 4.1.2 of this permit, the permittee shall install a continuous emissions monitoring system (CEMS). Said CEMS shall be designed, installed, operated and maintained in accordance with 40 CFR 60.13 or 40 CFR 75, as appropriate.
- 4.2.6 In order to determine compliance with the requirements of 4.1.3, the permittee shall monitor the type (natural gas or fuel oil) and number of each event.

### 4.3. Testing Requirements

- 4.3.1 The permittee shall conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, on each TurboPhase engine (TP1A-TP1D and TP2A-TP2D) in accordance with 40 CFR §60.4244.  
**[40 CFR §60.4243(b)(2)(ii)]**
- 4.3.2 In order to determine compliance with the emission limitations of 4.1.1, 4.1.4 and 4.1.14 of this permit, the permittee shall perform EPA approved stacktesting on each combustion turbine within 180 days of the issuance of this permit. Said testing shall be performed three times. Once when firing fuel oil with TurboPhase, once when firing natural gas without TurboPhase and once when firing natural gas with TurboPhase. Additionally, said testing shall utilize the following methods unless otherwise approved by the Director.

Pollutant	Test Method <sup>(1)</sup>
CO	Method 10B
PM	Method 202
PM (filterable only)	Method 5
PM <sub>10</sub> /PM <sub>2.5</sub>	Method 202
PM <sub>10</sub> /PM <sub>2.5</sub> (filterable)	Method 201A
VOCs	Method 18
H <sub>2</sub> SO <sub>4</sub>	Method 8
GHGS	Method 3A or 3B for CO <sub>2</sub> . Emission calculations for non CO <sub>2</sub> GHGs.

(1) All test methods refer to those given under 40 CFR 60, Appendix A

- 4.3.3 The testing required under 4.3.1 of this permit shall be repeated at least once every 5 years.
- 4.3.4 The permittee shall perform any applicable, required testing under 40 CFR 60 Subpart GG.

#### 4.4. Recordkeeping Requirements

- 4.4.1. **Record of Monitoring.** The permittee shall keep records of monitoring information that include the following:
- a. The date, place as defined in this permit and time of sampling or measurements;
  - b. The date(s) analyses were performed;
  - c. The company or entity that performed the analyses;
  - d. The analytical techniques or methods used;
  - e. The results of the analyses; and
  - f. The operating conditions existing at the time of sampling or measurement.
- 4.4.2. **Record of Maintenance of Air Pollution Control Equipment.** For all pollution control equipment listed in Section 1.0, the permittee shall maintain accurate records of all required pollution control equipment inspection and/or preventative maintenance procedures.
- 4.4.3. **Record of Malfunctions of Air Pollution Control Equipment.** For all air pollution control equipment listed in Section 1.0, the permittee shall maintain records of the occurrence and duration of any malfunction or operational shutdown of the air pollution control equipment during which excess emissions occur. For each such case, the following information shall be recorded:
- a. The equipment involved.
  - b. Steps taken to minimize emissions during the event.
  - c. The duration of the event.
  - d. The estimated increase in emissions during the event.

For each such case associated with an equipment malfunction, the additional information shall also be recorded:

- e. The cause of the malfunction.
  - f. Steps taken to correct the malfunction.
  - g. Any changes or modifications to equipment or procedures that would help prevent future recurrences of the malfunction.
- 4.4.4. Except as specified in paragraphs (a) and (b) of §60.116b, vessels either with a capacity greater than or equal to 151m<sup>3</sup> storing a liquid with a maximum true vapor pressure less than 3.5 kPa or with a capacity greater than or equal to 75 m<sup>3</sup> but less than 151 m<sup>3</sup> storing a liquid with a maximum true vapor pressure less than 15.0 kPa are exempt from the General Provisions (part 60, subpart A) and from the provisions of this subpart.  
[§60.110b(c)]
- 4.4.5 The owner or operator shall keep copies of all records required by this section, except for the record required by paragraph (b) of this section, for at least 2 years. The record required by paragraph (b) of this section will be kept for the life of the source.  
[§60.116b(a)]

- 4.4.6 The owner or operator of each storage vessel as specified in §60.110b(a) shall keep readily accessible records showing the dimension of the storage vessel and an analysis showing the capacity of the storage vessel.  
[§60.116b(b)]
- 4.4.7 Compliance with the turbines NO<sub>x</sub> emission limit of 4.1.1 shall be determined using the CEMS required by 4.2.5. Compliance with all other annual limits of 4.1.1 shall be determined by multiplying the monthly hours of operation by the applicable hourly limit. At the end of the month, that months emissions shall be added to the previous 12 months emissions to determine compliance.
- 4.4.8 In order to determine compliance with 4.2.6 of this permit, the permittee shall record the type and number of each event and the duration of each shutdown as limited by 4.1.3
- 4.4.9 The permittee shall record the type and amount of fuel used by each combustion turbine on an hourly basis as limited by 4.1.5.
- 4.4.10 The permittee shall record the blackstart generators operating times as limited by 4.1.19.
- 4.4.11 The permittee shall record the CEMS readings required by 4.2.5. Said records shall be used to determine compliance with the NO<sub>x</sub> emission limits of 4.1.1 and 4.1.14.

#### **4.5. Reporting Requirements**

- 4.5.1. The permittee shall submit any and all applicable notifications and reports required under 40 CFR 60 Subparts IIII, JJJJ and GG.

### CERTIFICATION OF DATA ACCURACY

I, the undersigned, hereby certify that, based on information and belief formed after reasonable inquiry, all information contained in the attached \_\_\_\_\_, representing the period beginning \_\_\_\_\_ and ending \_\_\_\_\_, and any supporting documents appended hereto, is true, accurate, and complete.

Signature<sup>1</sup>

(please use blue ink)

\_\_\_\_\_  
Responsible Official or Authorized Representative

\_\_\_\_\_  
Date

Name and Title

(please print or type)

\_\_\_\_\_  
Name

\_\_\_\_\_  
Title

Telephone No. \_\_\_\_\_

Fax No. \_\_\_\_\_

<sup>1</sup> This form shall be signed by a "Responsible Official." "Responsible Official" means one of the following:

- a. For a corporation: The president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:
  - (I) the facilities employ more than 250 persons or have a gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), or
  - (ii) the delegation of authority to such representative is approved in advance by the Director;
- b. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
- c. For a municipality, State, Federal, or other public entity: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of USEPA); or
- d. The designated representative delegated with such authority and approved in advance by the Director.

## Pursley, Steven R

---

**From:** Robbins, Emily C <ecrobbins@burnsmcd.com>  
**Sent:** Thursday, October 20, 2016 6:04 PM  
**To:** McClung, Jon D  
**Cc:** Pursley, Steven R; Adam.Birbeck@na.engie.com; Gatti, Gerald; Hauner-Davis, Mary  
**Subject:** Supplemental Air Dispersion Modeling  
**Attachments:** WV DEP Air Permit Letter Oct 20 2016.pdf

Jon and Steve,

Attached please find a cover letter for the additional modeling files for the blackstart modeling scenario. I will be sending the model files to Jon shortly through our Mass File Transfer (MFT) site shortly.

Please let us know if you have any questions about this submittal.

**Emily Robbins, PE\*** \ Burns & McDonnell  
Staff Environmental Engineer \ Env. Studies & Permitting  
O 816-823-6207 \ F 816-822-4299  
[ecrobbins@burnsmcd.com](mailto:ecrobbins@burnsmcd.com) \ [burnsmcd.com](http://burnsmcd.com)  
9400 Ward Parkway \ Kansas City, MO 64114  
\*Registered in KS

073-00022

FILE:	
COMPANY	Plains Energy
FACILITY	Facility
REGION	2
REG.	14-00761

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*Entire Document*  
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October 20, 2016

Jon McClung  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304

Re: Pleasants Energy, LLC - Supplemental Air Dispersion Modeling for Diesel (Blackstart) Generators

Dear Mr. McClung:

Pleasants Energy, LLC (Pleasants Energy) submitted a Prevention of Significant Deterioration (PSD) Air Permit Application for increased hours of operation of the simple-cycle combustion turbines at the Pleasants Energy facility in September 2015. It has been brought to our attention that a modeled scenario during a true blackstart for the facility was not modeled to show compliance with the PM<sub>2.5</sub> standards. The air dispersion modeling analysis modeled two of the diesel generators operating in peaking situations, which is a scenario that may occur throughout the year. This supplemental modeling is for the generators operating in a true blackstart scenario and for periodic testing of blackstart capabilities.

Blackstart operation could occur in rare circumstances when all five diesel generators must be used to startup the combustion turbines at the Pleasants Energy facility. This type of operation could occur in the event of a grid failure (when no electricity is available to startup the combustion turbines) and will also occur during annual testing of blackstart capabilities. In this case, all five diesel blackstart generators would need to operate for a maximum of four hours to bring one combustion turbine online. While this operation is considered to be intermittent/emergency with regards to the 1-hour NO<sub>2</sub> standard, the impacts on the 24-hour PM<sub>2.5</sub> standards should be evaluated. Therefore, all five diesel generators were modeled to operate in a blackstart scenario for four hours out of a 24-hour period.

Enclosed, please find supplemental Class II air dispersion modeling files for the Pleasants Energy PSD Air Permit Application. These additional modeling files demonstrate compliance with the 24-hour PM<sub>2.5</sub> NAAQS and Class II increment standards for blackstart operation at the facility. Table 2 shows the modeled 24-hour averaged PM<sub>2.5</sub> rate for each diesel generator during normal operation (assuming operation every hour for the 24-hour period) and during blackstart operation.

Table 1: Diesel Generator 24-Hour Average PM<sub>2.5</sub> Emission Rates

PM2.5 Emission Rate Normal Operation, Each Engine 24-Hour Average (lb/hr)	PM2.5 Emission Rate Blackstart Operation, Each Engine 24-hour Average (lb/hr)
0.72	0.12

The modeling was conducted using the same model setup and modeling methodologies employed for the original Class II air dispersion modeling submitted with the PSD air permit application. The modeling determined that there would be no exceedance of the 24-hour PM<sub>2.5</sub> NAAQS or Class II increment when all five generators are operating in a blackstart scenario or when testing for blackstart capabilities. Table 2 displays the results of the air dispersion modeling.



There were modeled PSD Increment exceedances for the PM2.5 24-hour averaging period. Further analysis demonstrated that the proposed Project is not significant at the receptors that exceed the Increment. As such, it was determined that there is enough available PM2.5 PSD Class II Increment to operate the generators in blackstart operation or during testing for blackstart capabilities in addition to the operation of the combustion turbines at the facility.

The results of the PSD Class II Increment analysis are shown below in Table 2. The second highest high was used for the 24-hour averaging periods

Table 2: PM2.5 Class II Increment Results Modeled Results

Pollutant	Averaging Period	UTM Coordinates <sup>a</sup>		Year	Predicted Concentration (µg/m <sup>3</sup> )	PSD Class II Increment (µg/m <sup>3</sup> )
		Easting (meters)	Northing (meters)			
PM2.5	24-hour	451,500	4,353,000	2013	882.8b,c	9

(a) UTM = Universal Transverse Mercator: NAD83

(b) Value is 2nd highest high

(c) The Project is not significant at any modeled exceedance

The modeling results showed that the Project is not contributing to any NAAQS exceedance when all five generators are operating in a blackstart scenario or when testing for blackstart capabilities. Although there were modeled NAAQS exceedances for the 24-hour PM2.5 averaging period, further analysis demonstrates that the Project is not significant (does not exceed the significant impact level [SIL]) at the receptors that exceed the NAAQS. Therefore, the Project will be in compliance with the NAAQS. The NAAQS analysis modeling results are shown in Table 3.

Table 3: PM2.5 NAAQS Modeling Results

Pollutant and Averaging Period	UTM Coordinates <sup>a</sup>		Year	Predicted Concentratio n	Background Concentratio n	Total Concentratio n	NAAQ S
	Easting (meters)	Northing (meters)		micrograms per cubic meter (µg/m3)			
	PM2.5, 24-hour	451,500		4,353,000	5 years	582.8	19.4

UTM = Universal Transverse Mercator: NAD83

The Project is not significant at any modeled exceedances

As WV DEP proceeds with the evaluation process, please contact the following persons with questions or for additional information regarding the PSD air permit application and air dispersion modeling performed for the project:

Bruce Birbeck  
ENGIE  
1990 Post Oak Blvd, Suite 1900  
Houston, TX 77056  
Phone: 713-636-1133  
Adam.Birbeck@na.engie.com

Mary Hauner-Davis  
Burns & McDonnell  
9400 Ward Parkway  
Kansas City, MO 64114  
Phone: 816-822-4252  
mhauner@burnsmcd.com



If we can be of any assistance to facilitate your staff's efforts, please do not hesitate to contact me or either of the two contacts listed above. Thank you for your time and efforts on our Project.

Sincerely,

A handwritten signature in black ink, appearing to read "Gerald Gatti", with a long horizontal flourish extending to the right.

Gerald Gatti  
Plant Manager

Attachments

cc: Steve Pursley, WV DEP  
Don Stacey, ENGIE  
Bruce Birbeck, ENGIE  
Mary Hauner-Davis, Burns & McDonnell

## Pursley, Steven R

---

**From:** McClung, Jon D  
**Sent:** Thursday, September 22, 2016 9:38 AM  
**To:** Pursley, Steven R  
**Cc:** Crowder, Laura M; McKeone, Beverly D; Kessler, Joseph R; Andrews, Edward S  
**Subject:** Pleasants Energy LLC - Modeling Review - PSD Application R14-0034  
**Attachments:** Pleasants\_Energy\_MEMO\_with\_attachments.pdf

Steve,

Attached is my memo documenting my review of the modeling analysis for Pleasants Energy LLC in support of PSD application R14-0034.

Regards,  
Jon.

---

Jonathan D. McClung, P.E.  
WV DEP Division of Air Quality  
601 57th Street SE  
Charleston WV 25304  
304-926-0499 ext. 1689  
[jon.d.mcclung@wv.gov](mailto:jon.d.mcclung@wv.gov)

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673-00022

FILE
COMPANY <u>Pleasant Energy</u>
FACILITY <u>hamp / y</u>
REGION <u>2</u> REG. <u>14-0034</u>

NON-CONFIDENTIAL



073-001022

FILE	
COMPANY	Pleasants Energy
FACILITY	Ward 1/1
REGION	2
REG.	14-0034



September 1, 2016

Steve Pursley  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304

**Re: Additional Information Regarding Greenhouse Gas BACT for Pleasants Energy, LLC PSD Air Permit Application**

Dear Mr. Pursley:

Pleasants Energy, LLC (Pleasants Energy) submitted a Prevention of Significant Deterioration Air Permit Application for increased hours of operation of the simple-cycle combustion turbines at the Pleasants Energy facility in September 2015. Pleasants Energy has additional information related to the greenhouse gas Best Available Control Technology (BACT) analysis for your review to support the BACT analysis.

The combustion turbines at Pleasants Energy were installed in 2001. As such, the greenhouse gas BACT determination is based on the efficiency of those turbines. The submitted BACT analysis for greenhouse gas emissions discussed possible ways to reduce greenhouse gas emissions from combustion turbines. One additional method to reduce greenhouse gas emissions from the combustion turbines that would also increase efficiency would be to replace the combustion turbines with brand-new combustion turbines.

A prior PM BACT analysis that was submitted for this project reviewed the costs to replace the combustion turbines. The cost for a new General Electric 7FA combustion turbine is \$36 million per turbine. Based on this cost it is clear that this option is not economically feasible for reducing greenhouse gas emissions from the combustion turbines. Therefore, this option has been thrown out as a feasible option for the greenhouse BACT analysis.

If WV DEP requires more information on this project or the BACT analysis, please feel free to contact either of the persons listed below:

Bruce Birbeck  
Engie  
1990 Post Oak Blvd, Suite 1900  
Houston, TX 77056  
Phone: 713-636-1133  
[Adam.Birbeck@na.engie.com](mailto:Adam.Birbeck@na.engie.com)

Mary Hauner-Davis  
Burns & McDonnell  
9400 Ward Parkway  
Kansas City, MO 64114  
Phone: 816-822-4252  
[mhauner@burnsmcd.com](mailto:mhauner@burnsmcd.com)

Thank you for your time and efforts on our Project.

Sincerely,

Gerald Gatti  
Plant Manager

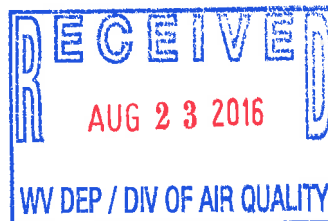
Attachments

cc: Don Stacey, GDF Suez  
Bruce Birbeck, GDF Suez  
Mary Hauner-Davis, Burns & McDonnell

Pleasants Energy LLC  
10319 South Pleasants Highway  
St. Marys, WV 26170  
Phone: 304-665-4200  
Fax: 304-665-4218

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August 22, 2016

Steve Pursley  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304

073-00022

FILE:	
COMPANY	Pleasants Energy
FACILITY	Waverly
REGION	2
REG.	M-00361

Re: Revised PM/PM10/PM2.5 BACT Analysis for Pleasants Energy, LLC PSD Air Permit Application

Dear Mr. Pursley:

Pleasants Energy, LLC (Pleasants Energy) submitted a Prevention of Significant Deterioration Air Permit Application for increased hours of operation of the simple-cycle combustion turbines at the Pleasants Energy facility in September 2015. Pleasants Energy has reviewed the BACT analysis for particulate matter (PM/PM10/PM2.5) and has revised the BACT analysis for this pollutant. Pleasants Energy, during their review, looked at all available information for the General Electric 7FA.03 combustion turbines including all pertinent, similar recent BACT determinations as well as actual stack test data for the GE 7FA.03 combustion turbines. The results of this review is a revised BACT analysis for PM/PM10/PM2.5 and lower BACT emission limitations for natural gas combustion.

The original and revised PM/PM10/PM2.5 BACT emission limitations are listed in Table 1, below.

Table 1  
Original and Revised PM/PM10/PM2.5 BACT Emission Limitations\*

Original BACT Emission Limitation	20.2 lb/hr (natural gas with and without TurboPhase) 39 lb/hr (fuel oil)
Revised BACT Emission Limitation	17.2 lb/hr (natural gas with TurboPhase) 15.0 lb/hr (natural gas without TurboPhase) 39 lb/hr (fuel oil)

\*Based on 3 1-hour stack tests.

With the lower emission limits for PM/PM10/PM2.5 on a lb/hr basis, the overall tons per year emissions have changed as well. Table 2 displays the PM/PM10/PM2.5 tons per year emissions for the Project based on the lower PM/PM10/PM2.5 emission rates.

*Entire Document*  
**NON-CONFIDENTIAL**

**ATTACHMENT A**  
**REVISED PM/PM10/PM2.5 BACT ANALYSIS**



## **6.4 BACT for Particulate Matter (PM/PM<sub>10</sub>/PM<sub>2.5</sub>) – Combustion Turbines**

### **6.4.1 Step 1. Identify Potential Control Strategies**

Particulate (PM/PM<sub>10</sub>/PM<sub>2.5</sub>) emissions from natural gas combustion sources consist of inert contaminants in natural gas, of sulfates from fuel sulfur or mercaptans used as odorants, of dust drawn in from the ambient air, and of particulate of carbon and hydrocarbons resulting from incomplete combustion. Therefore, units firing fuels with low ash content and high combustion efficiency exhibit correspondingly low particulate emissions.

Post-combustion controls, such as electrostatic precipitators (ESPs) or baghouses, have never been applied to commercial gas- and oil-fired turbines. Available control strategies include the use of low ash fuel, such as natural gas and low sulfur fuel oil, and combustion controls. BACT emission rates vary in the RBLC database with rates being listed as 0.0045 to 0.017 pounds per million British thermal units (lb/MMBtu) and 2.1 to 34.9 lb/hr for natural gas-fired combustion turbines (Table D-5, Appendix D) and between 13.7 to 19.5 lb/hr for fuel oil operation (Table D-6, Appendix D). As stated previously, these emission rates vary due to many reasons.

The combustion turbines at the Pleasants Energy facility are General Electric 7FA.03 combustion turbines. These turbines were constructed around approximately 2001. Most of the combustion turbines in the RBLC database that have gone through PSD recently are much newer versions (2014-2016) of the same combustion turbine with updated equipment that can achieve lower PM/PM<sub>10</sub>/PM<sub>2.5</sub> emission rates and vendors can guarantee lower emission rates.

### **6.4.2 Step 2. Identify Technically Feasible Control Technologies**

Particulate control devices are not typically installed on gas turbines. Post-combustion controls, such as ESPs or bag houses, have never been applied to commercial gas-fired turbines. For all natural gas-fired combustion units, particulate matter emissions are inherently low and add-on controls are not able to control these already low emissions much further. Therefore, the use of ESPs and bag house filters are both considered technically infeasible, and do not represent an available control technology. Further, to assist with reducing the emissions that are emitted out the stack, the inlet air, which is used during combustion of the fuel, is filtered prior to combustion and ultimately exhausted out the stack. This will further reduce the PM emissions from the outside air that is emitted out the stack.

In the absence of add-on controls, the most effective control method demonstrated for gas turbines is the use of low ash fuel, such as natural gas and low sulfur fuel oil, filtering the inlet air, and combustion

controls. This was confirmed by a survey of the RBLC database (Table D-5 and Table D-6, Appendix D of the original application) which showed no add-on PM/PM<sub>10</sub>/PM<sub>2.5</sub> control technologies for simple-cycle combustion turbines. Proper combustion control and the firing of fuels with negligible or zero ash content (such as natural gas) is the predominant control method listed.

As mentioned earlier, the only way to potentially reduce PM/PM<sub>10</sub>/PM<sub>2.5</sub> emissions further from this GE 7FA.03 simple-cycle combustion turbine would be to replace the combustion turbine with a brand-new updated version of the same combustion turbine.

#### 6.4.3 Step 3. Rank the Technically Feasible Control Technologies

The technically feasible PM/PM<sub>10</sub>/PM<sub>2.5</sub> control technologies for the combustion turbines are ranked by control effectiveness in Table Error! No text of specified style in document.-1.

**Table Error! No text of specified style in document.-1: Ranking of Technically Feasible PM/PM<sub>10</sub>/PM<sub>2.5</sub> Control Technologies for Combustion Turbines**

Control Technology	Reduction (%)	Controlled Emission Level <sup>a</sup>
Low ash and low sulfur fuel, inlet air filtration and combustion control	N/A (baseline)	17.2 lb/hr (natural gas with TurboPhase) 15.0 lb/hr (natural gas without TurboPhase) 39 lb/hr (fuel oil)
Replace combustion turbine with brand new GE 7FA.05 combustion turbine	53% (natural gas) 20% (fuel oil)	9.2 lb/hr (natural gas with TurboPhase) 7.0 lb/hr (natural gas without TurboPhase) 39 lb/hr (fuel oil)

(a) For all loads of 60% and greater.

(b) lb/hr = pounds per hour

#### 6.4.4 Step 4. Evaluate the Most Effective Control Technologies

##### Energy, Environmental, and Economic Impacts for Using Low Ash, Low Sulfur Fuel and Combustion Control

There are no energy, environmental, or economic impacts associated with combustion controls and filtering the inlet air; the use of low ash fuel is not an add-on control device.

Replacing the existing combustion turbines with a brand new GE 7FA.05 combustion turbine would have energy, environmental and economic impacts.

##### Energy Impacts from Replacing the Combustion Turbine

Replacing the combustion turbine with a new combustion turbine could mean that electricity would not be produced by Pleasants Energy during the demolition and construction period, even if the combustion turbines were replaced in phases. The electricity available to the grid would be reduced significantly

during the construction phase of the combustion turbine replacements. This could have a large impact on the surrounding area; it could mean brown outs and blackouts in periods of very high peak demand, especially given the fact that many of the coal plants in the area are shutting down due to environmental regulations and etc.

#### Environmental Impacts from Replacing the Combustion Turbine

Demolition of the existing combustion turbine will cause the production of waste, some of which may be recycled or reused in some fashion. This is an impact that would not occur if the combustion turbines were not replaced, therefore this is an environmental impact.

#### Economic Impacts from Replacing the Combustion Turbine

The capital costs associated with purchasing and installing a brand new 7FA.05 combustion turbine are shown in Table E-5, attached to this revised BACT. This cost does not include the cost to demolish the existing combustion turbines, nor does it include costs lost in revenue while the demolition and construction are taking place. The total capital investment of installing a new 7FA.05 combustion turbine is approximately \$73,609,000. The annualized costs associated with a brand new 7FA.05 combustion turbine are found in Table E-6, Appendix E. On an annual basis, the new combustion turbine would cost approximately \$5,932,000 which results in a cost per ton of PM/PM<sub>10</sub>/PM<sub>2.5</sub> removed of almost \$328,700 while reducing particulate emissions by only 19 tons of per year for both natural gas operation and fuel oil operation, based on worst-case normal operation emissions. Therefore, any type of reduction in PM emissions would result in costs that would not be economical.

#### **6.4.5 Step 5. Proposed PM/PM<sub>10</sub>/PM<sub>2.5</sub> BACT Determination**

The use of low ash and low sulfur fuels, inlet air filtration, and good combustion control represents BACT for PM/PM<sub>10</sub>/PM<sub>2.5</sub> control for the combustion turbines. These operational controls will limit PM/PM<sub>10</sub>/PM<sub>2.5</sub> emissions to approximately 17.2 lb/hr with TurboPhase and 15.0 lb/hr without TurboPhase on natural gas. Fuel oil operation will be limited to 39 lb/hr. Compliance will be determined on a 3-run stack test basis. This limit includes front and back half PM/PM<sub>10</sub>/PM<sub>2.5</sub> emissions.

## **COST TABLES**

Table E-5  
Simple-Cycle Operation PM/PM10/PM2.5 BACT - New 7FA Capital Costs

Item	Value	Basis
<b>Direct Costs</b>		
<b>Purchased Equipment Cost</b>		
Equipment cost + auxiliaries [A]	\$36,000,000	A
Instrumentation	\$3,600,000	0.10 x A
Freight	\$1,800,000	0.05 x A
<b>Total Purchased Equipment Cost (PEC) [B]</b>	<b>\$41,400,000</b>	<b>B = 1.15 x A</b>
<b>Direct Installation Costs</b>		
Foundations and supports	\$3,312,000	0.08 x B
Handling and erection	\$5,796,000	0.14 x B
Electrical	\$1,656,000	0.04 x B
Piping	\$828,000	0.02 x B
Insulation for ductwork	\$414,000	0.01 x B
Painting	\$414,000	0.01 x B
<b>Total Direct Installation Cost</b>	<b>\$12,420,000</b>	<b>0.30 x B</b>
Site Preparation (SP)	\$0	As required
Buildings (Bldg.)	\$2,070,000	As required (5-18% PEC)
<b>Total Direct Cost (DC)</b>	<b>\$55,890,000</b>	<b>1.30B + SP + Bldg.</b>
<b>Indirect Costs (Installation)</b>		
Engineering	\$4,140,000	0.10 x B
Construction and field expenses	\$2,070,000	0.05 x B
Contractor fees	\$4,140,000	0.10 x B
Start-up	\$828,000	0.02 x B
Performance test	\$414,000	0.01 x B
Contingencies	\$2,070,000	0.05 x B
CEMs	\$70,000	Vendor estimate
PSD Permit	\$75,000	Application + Draft Permit
Other	\$0	As required
Construction Period	1	Years
Interest Rate	7	Percent
Interest during construction (Int.)	\$3,912,300	DC * i * n
<b>Total Indirect Cost (IC)</b>	<b>\$17,719,300</b>	<b>0.33B + Int. + CEMs + PSD</b>
<b>Total Capital Investment (TCI) = DC + IC</b>	<b>\$73,609,300</b>	<b>1.63B + Bldg. + Int. + CEMs + PSD</b>

**Table E-6**  
**Simple-Cycle Operation PM10/PM2.5 BACT - New 7FA Annual Cost**

Item	Value	Basis
<b>Direct Annual Costs (DC)</b>		Assumed none for this analysis
<b>Indirect Annual Costs (IC)</b>		
Overhead	\$0	OAQPS SCR Assumption
Administrative charges	\$0	OAQPS SCR Assumption
Annual Contingency	\$0	OAQPS SCR Assumption
Property taxes	\$0	OAQPS SCR Assumption
Insurance	\$0	OAQPS SCR Assumption
Capital Recovery	\$5,931,909	CRF * TC! (30 year life, 7% interest)
<b>Total Indirect Costs (\$/yr)</b>	<b>\$5,931,909</b>	
<b>Total Annualized Costs (TAC) (\$)</b>	<b>\$5,931,909</b>	
<b>Total Pollutant Controlled (ton/yr) (Natural Gas)</b>	<b>18.0</b>	Reduction on Natural Gas Based on Vendor Data
<b>Total Pollutant Controlled (ton/yr) (Fuel Oil)</b>	<b>1.0</b>	Reduction on Fuel Oil
<b>Cost Effectiveness (\$/ton)</b>		

## Pursley, Steven R

**From:** Birbeck, Adam Bruce <Adam.Birbeck@na.engie.com>  
**Sent:** Thursday, July 14, 2016 4:29 PM  
**To:** Pursley, Steven R; 'mhauner@burnsmcd.com'  
**Subject:** RE: Pleasants Energy Question

073-00021

FILE	
COMPANY	Pleasants Energy
FACILITY	Waverly
REGION	2 REG. 14-0021

Hi Steve,

In response to your question below:

When the combustion turbines are operating on natural gas and excess air is injected from the Turbophase units, the output from the combustion turbines increases and therefore the air flow out the stack, also increases, which increases the emissions from the combustion turbines stacks. While operating on natural gas, the combustion turbine is not close to its maximum output of 190 MW, therefore the emissions are allowed to increase, keeping the same air to fuel ratio (more air equals more fuel to the combustion turbine which increases the emissions).

When Turbophase is injecting air into the combustion turbine while operating on fuel oil, during a cold day when the emissions are expected to be the highest, the turbine is already at its maximum output (~190 MW). Therefore, the combustion turbine cannot handle any additional injected air and the fuel input must be reduced to accommodate the extra air. Due to this, the emission rates will not increase over the maximum lb/hr emission rates while operating on fuel oil.

Further, CEMS for NOx emissions be used to ensure compliance with the emission limit while operating on fuel oil with the addition of Turbophase.

Mary and will give you a call to discuss now.

Thanks,

Bruce

### Bruce Birbeck

Field Services Manager - Environmental  
ENGIE



1990 Post Oak Blvd., Suite 1900  
Houston, TX USA 77056  
Office: 713-636-1133 / Cell: 281-639-7342  
[adam.birbeck@na.engie.com](mailto:adam.birbeck@na.engie.com)

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**From:** Pursley, Steven R [mailto:Steven.R.Pursley@wv.gov]  
**Sent:** Wednesday, July 13, 2016 12:38 PM

**To:** 'mhauner@burnsmcd.com'; Birbeck, Adam Bruce

**Subject:** Pleasants Energy Question

Mary & Bruce,

Question regarding page 4-3, Table 4-2, of the application. Can you explain why turbine emissions do not increase with TurboPhase when firing fuel oil? If it's easier, feel free to give me a call at your convenience.

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## Pursley, Steven R

---

**From:** Pursley, Steven R  
**Sent:** Tuesday, July 12, 2016 11:04 AM  
**To:** 'wentworth.paul@epa.gov'  
**Subject:** WV PSD Application Notification

Paul,

Below is a link to a PSD application (retroactive construction of a major stationary source) submitted to the WVDAQ on September 18, 2015. The application was deemed complete on April 18, 2016. My apologies on the delay notifying EPA but I've only recently began reviewing the application in earnest. USEPA will, of course, be notified after WV makes a preliminary determination on the facility and we proceed to public notice. Let me know if you have any questions or comments.

[http://www.dep.wv.gov/daq/Documents/October%202015%20Applications/073-00022\\_APPL\\_R14-0034.pdf](http://www.dep.wv.gov/daq/Documents/October%202015%20Applications/073-00022_APPL_R14-0034.pdf)

Thanks

Steve Pursley, PE  
WVDAQ

073-00022

FILE:	Pursley, Steve	
COMPANY	Wentworth	
FACILITY	Wentworth	
REGION	2	REG. 14-0034

NON-CONFIDENTIAL

**Pursley, Steven R**

---

**From:** Pursley, Steven R  
**Sent:** Tuesday, July 05, 2016 3:25 PM  
**To:** Gatti, Gerald  
**Cc:** 'mhauner@burnsmcd.com'; 'Birbeck, Adam Bruce'  
**Subject:** WV DAQ NSR Permit Application Complete for Pleasants Energy, LLC; Waverly Power Plant

**RE: Application Status: Complete  
Pleasants energy, LLC; Waverly Power Plant  
Permit Application R14-0034  
Plant ID No. 073-00022**

Mr.Gatti

Your application for a Major Construction permit for a natural gas fired, simple cycle electric peaking station was received by this Division on September 18, 2015 and assigned to the writer for review. Upon initial review of said application, it was determined that the application was incomplete. However, with the submittal of additional information (the last of which was received on April 18, 2016) the application has now been determined to be complete and, therefore, the statutory review period commenced on April 18, 2016.

This determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit determination.

Should you have any questions, please contact Steven R. Pursley, PE at (304) 926-0499 ext. 1218 or reply to this email.

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## Pursley, Steven R

---

**From:** Stacy, Andrea <andrea\_stacy@nps.gov>  
**Sent:** Thursday, April 21, 2016 1:54 PM  
**To:** O'Dea, Claire B -FS  
**Cc:** Hauner-Davis, Mary; jalyn\_cummings@nps.gov; McClung, Jon D; susan\_johnson@nps.gov; Kessler, Joseph R; Pursley, Steven R; John\_Notar@nps.gov; Pitrolo, Melanie -FS; Anderson, Bret A -FS; Salazer, Holly; Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda  
**Subject:** Re: Pleasants Energy Class I Visibility and Deposition Modeling Report

Hi Mary,

The NPS concurs with the USFS determination, we do not anticipate any significant additional impacts to AQRVs in Shenandoah NP as a result of this facility. We want to echo Claire's thanks for your responsiveness to our requests and concerns.

Although we will not be providing further comment with regard to the AQRV impacts or analyses, for record keeping purposes, we would appreciate it if WV DEP could submit a copy of the draft permit and associated BACT and staff analyses when these become available.

Thank you again involving the NPS in this permit determination. Please feel free to contact me if you have additional questions.

Regards,  
Andrea Stacy

On Thu, Apr 14, 2016 at 3:15 PM, O'Dea, Claire B -FS <[cbodea@fs.fed.us](mailto:cbodea@fs.fed.us)> wrote:

Hello All,

I want to thank Mary for sending along the final report on the Class I Visibility and Deposition Modeling for the Pleasants Energy Facility, as well as the CALPUFF modeling files. And I want to thank all participants in our ongoing discussions for your participation and responsiveness. Based on the visibility and deposition analysis results, and comparison with our resource concern thresholds, we anticipate no significant impacts to any air quality related values (AQRVs) at Class I Areas administered by the Forest Service.

Should the nature of this project change such that maximum emissions increase, please let us know so that we can re-evaluate the proposal.

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## Pursley, Steven R

**From:** O'Dea, Claire B -FS <cbodea@fs.fed.us>  
**Sent:** Thursday, April 14, 2016 5:15 PM  
**To:** Hauner-Davis, Mary; jalyn\_cummings@nps.gov; McClung, Jon D; andrea\_stacy@nps.gov; susan\_johnson@nps.gov; Kessler, Joseph R; Pursley, Steven R; John\_Notar@nps.gov; Pitrolo, Melanie -FS; Anderson, Bret A -FS; Salazer, Holly  
**Cc:** Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda  
**Subject:** RE: Pleasants Energy Class I Visibility and Deposition Modeling Report

Hello All,

I want to thank Mary for sending along the final report on the Class I Visibility and Deposition Modeling for the Pleasants Energy Facility, as well as the CALPUFF modeling files. And I want to thank all participants in our ongoing discussions for your participation and responsiveness. Based on the visibility and deposition analysis results, and comparison with our resource concern thresholds, we anticipate no significant impacts to any air quality related values (AQRVs) at Class I Areas administered by the Forest Service.

Should the nature of this project change such that maximum emissions increase, please let us know so that we can re-evaluate the proposal.

Thank you again for keeping the Forest Service informed about permit applications for facilities that may impact Forest Service Class I Areas. Should you have any questions about this determination, please let me know.

Best,



Claire O'Dea, PhD  
Air Quality Specialist  
Forest Service  
Eastern Regional Office

p: 202-205-1686  
c: 919-368-6879  
[cbodea@fs.fed.us](mailto:cbodea@fs.fed.us)

1400 Independence Ave, SW, #1121  
Washington, DC 20250

[www.fs.fed.us](http://www.fs.fed.us)



Caring for the land and serving people

073-00022

FILE:	
COMPANY	Pleasants Energy
FACILITY	Wauchoy
REGION	2
REG.	14-00301

**From:** Hauner-Davis, Mary [mailto:mhauner@burnsmcd.com]

**Sent:** Wednesday, March 02, 2016 6:13 PM

**To:** holly\_salazer@nps.gov; jalyn\_cummings@nps.gov; jon.d.mcclung@wv.gov; andrea\_stacy@nps.gov; susan\_johnson@nps.gov; Joseph.R.Kessler@wv.gov; Steven.R.Pursley@wv.gov; John\_Notar@nps.gov; Pitrolo, Melanie - FS <mpitrolo@fs.fed.us>; O'Dea, Claire B -FS <cbodea@fs.fed.us>; Anderson, Bret A -FS <baanderson02@fs.fed.us>  
**Cc:** Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda <mnelson@burnsmcd.com>

**Subject:** Pleasants Energy Class I Visibility and Deposition Modeling Report

All:

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Attached, please find the final report on the Class I Visibility and Deposition Modeling for the Pleasants Energy facility. As requested, a hard copy of the report and a USB drive with all of the CALPUFF modeling files have been sent to Jon McClung at WV DEP, Bret Anderson at USDA Forest Service and John Notar at National Park Service. These packages should arrive via Fed-Ex to your offices tomorrow.

Please review the modeling report and files. We look forward to hearing from you soon. I will coordinate a conference call in the near future to discuss the report and modeling.

Thank you for your time and we look forward to your review of the positive results from the modeling.

Mary Hauner-Davis

**Mary Hauner-Davis \ Burns & McDonnell**  
**Manager, Air/Noise Department \ Env. Studies and Permitting**  
**O 816-822-4252 \ M 402-730-9631 \ F 816-822-4299**  
[mhauner@burnsmcd.com](mailto:mhauner@burnsmcd.com) \ burnsmcd.com  
9400 Ward Parkway \ Kansas City, MO 64114



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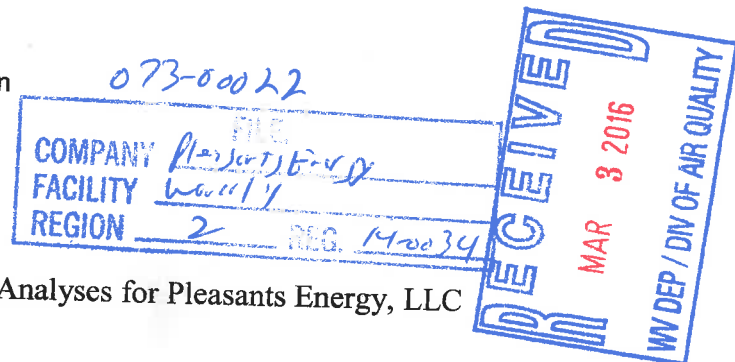
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NON-CONFIDENTIAL

March 2, 2016

Jon McClung  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304



Re: Visibility, Deposition and Class I Increment Analyses for Pleasants Energy, LLC

Dear Mr. McClung:

Pleasants Energy, LLC (Pleasants Energy) submitted a Prevention of Significant Deterioration Air Permit Application for increased hours of operation of the simple-cycle combustion turbines at the Pleasants Energy facility, located near Waverly, West Virginia. The Pleasants Energy facility is a 300-megawatt simple-cycle electric generating station that currently operates under Title V permit number R30-07300022-2014. This project will increase the annual operation on natural gas and fuel oil with a combined fuel limit of 19,081,721,569 standard cubic feet per year (SCF/yr), where every gallon of fuel oil combusted is equal to 889 SCF.

In the course of the PSD application review, the Federal Land Managers requested visibility and deposition analyses for the four Class I areas within 300 kilometers of the Pleasants Energy facility (Shenandoah National Park, James River Face Wilderness, Otter Creek Wilderness, and Dolly Sods Wilderness). As such, Class I visibility, deposition and PSD Class I increment analyses were completed for the project.

CALPUFF modeling reports were prepared based on the Class I modeling that was performed for this project. The reports are attached to this letter along with a USB drive that contains the modeling files for your review.

As the Department of Environmental Protection proceeds with the evaluation of the CALPUFF modeling, please contact the following persons with questions or for additional information:

Bruce Birbeck  
GDF Suez North America  
1990 Post Oak Blvd, Suite 1900  
Houston, TX 77056  
Phone: 713-636-1133  
Adam.Birbeck@gdfsuezna.com

Mary Hauner-Davis  
Burns & McDonnell  
9400 Ward Parkway  
Kansas City, MO 64114  
Phone: 816-822-4252  
mhauner@burnsmcd.com

*Entire Document*  
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If we can be of any assistance to facilitate your staff's efforts, please do not hesitate to contact me or either of the two contacts listed above. Thank you for your time and efforts on our Project.

Sincerely,



**Gerald M. Gatti**

Plant Manager

Pleasants Energy, LLC

10319 South Pleasants Highway

St. Marys, WV 26170

Direct 304-665-4201

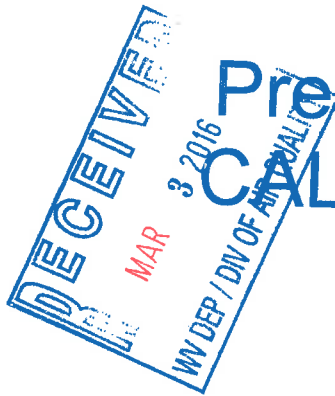
Fax 304-665-4218

[gerald.gatti@gdfsuezna.com](mailto:gerald.gatti@gdfsuezna.com)

#### Attachments

cc: Steve Pursley, WV DEP  
Don Stacey, GDF Suez  
Bruce Birbeck, GDF Suez  
Mary Hauner-Davis, Burns & McDonnell  
Minda Nelson, Burns & McDonnell  
National Park Service  
USDA Forest Service





# Prevention of Significant Deterioration CALPUFF Class I Increment Modeling Report

**Pleasants Energy, LLC**

**Pleasants Energy Facility  
Project No. 84344**

**March 2016**

# **Prevention of Significant Deterioration CALPUFF Class I Increment Modeling Report**

prepared for

**Pleasants Energy, LLC  
Pleasants Energy Facility  
Waverly, West Virginia**

**Project No. 84344**

**March 2016**

prepared by

**Burns & McDonnell Engineering Company, Inc.  
Kansas City, Missouri**

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**LIST OF ABBREVIATIONS**

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AIRS	Aerometric Information Retrieval System
AQRV	Air Quality Related Value
CASTNet	Clean Air Status and Trends Network
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
GT	gas turbine
$\text{HNO}_3$	nitric acid
IWAQM	Interagency Workgroup on Air Quality Modeling
K	Kelvin
lb/hr	pounds per hour
LCC	Lambert conic conformal
m/s	meters per second
MM5	Fifth-Generation Penn State/NCAR Mesoscale Model
MP	McElroy-Pooler
MW	megawatt
NCAR	National Center for Atmospheric Research
$\text{NO}_3$	nitrate
$\text{NO}_x$	nitrogen oxides

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
NPS	National Park Service
PG	Pasquill-Gifford
Pleasants Energy	Pleasants Energy, LLC
PM <sub>10</sub>	particulate matter less than 10 microns in diameter
PM <sub>2.5</sub>	particulate matter less than 2.5 microns in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
SCF	standard cubic feet
SCF/yr	standard cubic feet per year
SIL	Significant Impact Level
SO <sub>2</sub>	sulfur dioxide
SO <sub>4</sub>	sulfate
ULSD	ultra-low sulfur diesel
UTM	Universal Transverse Mercator
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
WVDEP	West Virginia Department of Environmental Protection

## 1.0 INTRODUCTION

Pleasants Energy, LLC (Pleasants Energy), located near Waverly within Pleasants County, West Virginia, installed two simple-cycle General Electric 7FA combustion turbines at the Pleasants Energy facility in 2001, under permit number R13-2373, with an administrative amendment in 2006 (R13-2373A). The permit had operational restrictions to limit the facility's potential to emit to less than 250 tons per year of any criteria pollutant so the facility could be minor for Prevention of Significant Deterioration (PSD). Pleasants Energy submitted a PSD air construction permit application in September 2015 to increase the hours of operation of the combustion turbines (hereafter referred to as Project). Since the Project will lift the synthetic minor limitation on the combustion turbines and will increase emissions to greater than 250 tons per year, this Project is subject to PSD.

The U.S. Environmental Protection Agency (EPA) states that a PSD Class I increment analysis should be performed for Class I areas located within 300 kilometers of a proposed PSD facility. There are four Class I areas that are within 300 kilometers of the Project:

- Otter Creek Wilderness (130 kilometers)
- Dolly Sods Wilderness (160 kilometers)
- Shenandoah National Park (200 kilometers)
- James River Face Wilderness (253 kilometers)

The locations of the Project and the four Class I areas listed above are shown in Figure A-1 in Appendix A.

As an initial screening effort to determine if further analysis is required for the Class I increment analysis, modeled impacts at receptors placed 50 kilometers in the direction of each Class I area were compared to the Class I Significant Impact Level (SIL) using AERMOD. Both the minimum and maximum receptor elevations at each of the respective Class I areas were modeled at the 50 kilometer edge of the AERMOD grid and are shown in Table 1-1. The maximum modeled impacts at the 50 kilometer edge of the AERMOD grid in comparison to the Class I SIL are shown in Table 1-2. The preliminary screening analysis showed that the 24-hour  $PM_{2.5}$  fuel oil conservative screening impacts exceed the 24-hour Class I  $PM_{2.5}$  SIL for Otter Creek Wilderness and James River Face Wilderness. For all other averaging periods and pollutants, the screening modeling showed that the Project will not significantly impact the four Class I areas that are within 300 kilometers of the Project, and no further analysis is required.

**Table 1-1: AERMOD Screening Class I Receptor Coordinates and Elevations**

Class I Area	UTM Coordinates <sup>a</sup>		Maximum Elevation (meters)	Minimum Elevation (meters)	Hill Height (meters)
	Easting (meters)	Northing (meters)			
Otter Creek Wilderness	518,049.4	4,342,002	1,148	688	1,148
Dolly Sods Wilderness	518,049.4	4,342,002	1,219	824	1,219
Shenandoah National Park	513,993.2	4,331,840	1,123	247	1,123
James River Face Wilderness	501,712.5	4,316,433	792	213	792

(a) UTM = Universal Transverse Mercator: North American Datum 83

**Table 1-2: Screening Modeled Impacts and Class I Significant Impact Level**

Pollutant	Averaging Time	Maximum Modeled value at 50 kilometer Receptor ( $\mu\text{g}/\text{m}^3$ ) <sup>b,c</sup>				Class I Significant Impact Level ( $\mu\text{g}/\text{m}^3$ ) <sup>c</sup>
		Otter Creek Wilderness	Dolly Sods Wilderness	Shenandoah National Park	James River Face Wilderness	
PM <sub>10</sub>	24-hour	0.0972	0.0499	0.0526	0.0733	0.3
	Annual	0.0036	0.0018	0.0018	0.0020	0.2
PM <sub>2.5</sub>	24-hour	<b>0.0972</b>	0.0499	0.0526	<b>0.0733</b>	0.07
	Annual	0.0036	0.0018	0.0018	0.0020	0.06
NO <sub>2</sub> <sup>a</sup>	Annual	0.0139	0.0071	0.0071	0.0078	0.1

Source: 40 Code of Federal Regulations (CFR) §52.21(k)(2), 1978

(a) Modeled as NO<sub>x</sub>

(b) Numbers in bold indicate the Class I significant impact level is exceeded

(c)  $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter

Because PM<sub>2.5</sub> 24-hour PSD Class I increment screening impacts were not below the SIL 50 kilometers from the site, a PSD Class I increment analysis using CALPUFF was performed for Otter Creek Wilderness and James River Face Wilderness to assess the impacts of fuel oil operation.

A Class I increment modeling protocol was submitted to the West Virginia Department of Environmental Protection (WVDEP) in January 2016 (Appendix B). The protocol presented Class I increment modeling parameters to be used in determining the increment impacts for the Project. The protocol allowed the WVDEP to review and comment upon the methodology to be employed in the Class I increment modeling analysis and concurrence on the modeling methodologies was received from the WVDEP.

Included in this report is a brief description of the Project, proposed model to be used, modeling methodologies, and model input parameters. This Class I increment modeling report and modeling has been drafted in accordance with guidance from the EPA, Federal Land Manager (FLM), and WVDEP modeling guidelines.





## 2.0 PROJECT DESCRIPTION

Pleasants Energy plans to increase the hours of operation of its two simple-cycle General Electric 7FA combustion turbines at the Pleasants Energy facility located near Waverly, West Virginia. The facility currently operates under Title V permit number R30-07300022-2014. The facility is located in Pleasants County, which is currently designated as an attainment/unclassified area for all criteria pollutants in 40 Code of Federal Regulations (CFR) Part 81. The location of the Pleasants Energy site is shown in Figure A-2 in Appendix A.

The combustion turbines operate in simple-cycle mode only to generate electricity. The combustion turbines will be permitted with restricted operation. The turbines will have a combined NO<sub>x</sub> limit of 464.6 tons per year, with compliance shown via continuous emission monitors. Additionally, the combustion turbines will be limited to 16.5 tons per year of SO<sub>2</sub> emissions on an annual basis based on ultra-low sulfur diesel (ULSD), which contains 15 parts per million (ppm) sulfur. For all other pollutants, the turbines will have an overall fuel usage limit for both combustion turbines combined of 19,081,721,569 standard cubic feet per year (SCF/year) which includes both fuel oil and natural gas. When fuel oil is combusted, it will be equal to 889 standard cubic feet (SCF) for every gallon combusted. This fuel limit methodology is consistent with Pleasants Energy's current minor source permit limitation.

Each of the combustion turbines is currently permitted to operate with TurboPhase. The TurboPhase systems increase the output of each of the existing combustion turbines up to approximately 18 megawatts (MW) by injecting externally supplied air into the combustion turbine after compressor discharge at the inlet to the combustor. This increases mass flow through the turbines and generator output. Therefore, maximum emissions occur when TurboPhase is operating on the combustion turbines.

The Project emission units, emission unit sizes, number of units, and fuels combusted are displayed in Table 2-1.

**Table 2-1: Project Emission Units and Approximate Operation Estimates**

<b>Emissions Unit</b>	<b>Size<sup>a,b</sup></b>	<b>Number of Units</b>	<b>Fuel</b>	<b>Estimated Operation</b>
Combustion turbine	191.2 MW (natural gas) 196.9 MW (fuel oil)	2	Natural gas	19,081,721,569 SCF/year both turbines combined <sup>a,c</sup>
			Fuel oil	
			Natural gas	365 start-ups and shutdowns (each) <sup>d</sup>
			Fuel oil	20 start-ups and shutdowns (each) <sup>d</sup>

(a) MW = megawatt, SCF/year = standard cubic feet per year

(b) Output is increased by 18 MW when TurboPhase is operating.

(c) The standard cubic feet (SCF) limit includes both fuel oil and natural gas where fuel oil usage equals 889 SCF for every gallon combusted.

(d) One start-up is limited to 2 hours and one shutdown is limited to 1 hour each.

### 3.0 PROPOSED MODEL

CALPUFF and its meteorological model CALMET, are designed to handle complex terrain, the long source to receptor distances, chemical transformation and deposition, and other issues related to Class I impacts. The CALPUFF modeling system has been adopted by the EPA as a guideline model for long-range transport (source to receptor distances of 50 kilometers or more), and for use on a case-by-case basis in complex flow for shorter distances. CALPUFF is recommended for Class I impact assessments by the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) and the Interagency Workgroup on Air Quality Modeling (IWAQM).

Pleasants Energy is proposing to use the following EPA-approved versions of the CALPUFF modeling system for the Class I increment modeling (Exponent, no date):

- CALMET Version 5.8.4, Level 130731
- CALPUFF Version 5.8.4, Level 130731
- CALPOST Version 6.221, Level 080724

#### 3.1 Modeling Domain

The Visibility Improvement State and Tribal Association of the Southeast (VISTAS) is the regional consortium of Federal, state, local, and tribal organizations formed to "address regional haze and visibility problems in the southeastern United States." The VISTAS Domain 5 data was used for the modeling domain and is shown in Figure A-3 in Appendix A.

The specifications for VISTAS Domain 5 are shown in Table 3-1.

**Table 3-1: Class I Modeling Domain Specifications**

Domain	Southwest Coordinates	Number of X Grid Cells	Number of Y Grid Cells	Horizontal Grid Spacing (kilometers)
VISTAS Domain 5	NWS-84 X coordinate = 1,066.005 kilometers Y coordinate = -686.004 kilometers	228	232	4

The VISTAS Domain 5 is 912 by 928 kilometers. Ten vertical levels were used. The cell face heights are located at 0, 20, 40, 80, 160, 320, 640, 1,200, 2,000, 3,000, and 4,000 meters.

The Lambert conformal conic (LCC) projection system was used for the CALMET/CALPUFF modeling domain to account for the Earth's curvature. The LCC grid projection will match the Fifth-Generation Penn State/National Center for Atmospheric Research (NCAR) Mesoscale Model (MM5) data.

### **3.2 Receptors**

The National Park Service (NPS) database of modeling receptors for Class I areas was downloaded from the NPS website (NPS, no date) and was used for this analysis for each of the Class I areas being modeled. The receptor data will use the LCC projection system.

### **3.3 CALMET**

CALMET is a diagnostic meteorological model that produces three-dimensional wind and temperature fields and two-dimensional fields of mixing heights and other meteorological fields. It contains slope flow effects, terrain channeling, and kinematic effects of terrain.

One of the products of VISTAS was the development of a standardized CALMET gridded wind field for use in long-range transport of pollutants. Therefore, processed and approved CALMET VISTAS Domain 5 was used for this analysis. The processed data includes 3 years of hourly output data (2001, 2002 and 2003) in the LCC projection coordinate system. A summary of major characteristics of the CALMET model is outlined in the CALMET User's Guide (Scire, 2000b).

### **3.4 CALPUFF**

CALPUFF is a non-steady state model that includes algorithms for building downwash effects as well as chemical transformation, wet deposition, and dry deposition. CALPUFF can combine effects of terrain, dry and wet deposition, and overwater dispersion to predict pollutants' impacts.

The CALPUFF simulations were conducted for the years 2001 to 2003 using the following model options:

- Gaussian distribution
- Partial plume path adjustment for terrain
- Transitional plume rise
- Stack tip downwash
- Wet deposition, dry deposition, and chemical transformation using the MESOPUFF II scheme
- Pasquill-Gifford (PG) dispersion coefficients (rural areas), McElroy-Pooler (MP) dispersion coefficients (urban areas)

Deposition and transformation effects were modeled using the default dry deposition model, the scavenging coefficient wet removal module, and the default MESOPUFF II chemical transformation mechanism. The major features and options of the CALPUFF model are outlined in the CALPUFF User's Guide (Scire, 2000a).

The FLM's CALPUFF Reviewer's Guide was followed as a guide for this analysis (Anderson, 2011).

#### **3.4.1 Ozone Background Data**

Hourly measured ozone concentrations provided in an external "ozone.dat" file were based on VISTAS datasets and was used for the analysis. Data from the EPA Aerometric Information Retrieval System (AIRS) and Clean Air Status and Trends Network (CASTNet) were used to develop the hourly ozone data file.

#### **3.4.2 Ammonia Background Data**

A conservative constant ammonia concentration of 10 parts per billion was assumed for all CALPUFF modeling runs. This concentration was specified in the CALPUFF input file.

## 4.0 SITE-SPECIFIC MODELING DATA

The Project-specific source emissions and stack parameters used in the modeling analysis are explained in detail in this chapter.

The 24-hour maximum emission rate for fuel oil was modeled for the PM<sub>2.5</sub> increment analysis. The detailed emissions calculations that demonstrate how the emission rates were obtained are shown in Appendix C.

The fuel oil short-term rates was modeled with 100 percent load fuel oil operation stack parameters, since it is the predominant maximum emission rate for a 24-hour period. All emissions and stack parameters are shown in Table 4-1.

**Table 4-1: Combustion Turbine Emissions and Modeling Parameters – per Turbine**

Pollutant	Fuel Oil 24-hour Maximum Emission Rate
PM <sub>2.5</sub>	39.00 lb/hr (4.91 g/s) <sup>a</sup>
<b>Stack Parameters</b>	
X GT1/GT2 (kilometers) <sup>a, b</sup>	1,334.16/1,334.21
Y GT1/GT2 (kilometers) <sup>a, b</sup>	41.42/41.44
Base elevation (meters)	198.12
Stack temperature (K) <sup>a</sup>	883.71
Exit velocity (m/s) <sup>a</sup>	45.17
Stack height (meters)	34.90
Stack diameter (meters)	5.49

(a) lb/hr = pound per hour; g/s = grams per second; K = Kelvin; m/s = meters per second; GT = gas turbine

(b) Lambert conic conformal NWS-84

The size distribution is shown in Table 4-2.

**Table 4-2: Size Distribution for Oil-Fired Combustion Turbines**

Modeled Species Name	Size Distribution (%)	Median Diameter (microns)	Geometric Standard Deviation (microns)
PM <sub>2.5</sub>	100	3.00	2.00

## 5.0 CLASS I INCREMENT ANALYSIS

The IWAQM developed a set of procedures for use in evaluating increment impacts (EPA, 1998) that are referenced in the FLAG Phase I Report – Revised (2010) (FLAG 2010) on assessing AQRV in Class I areas (USFS, NPS, and USFWS, 2010). The methodologies listed in FLAG 2010 and FLM’s CALPUFF Reviewer’s Guide was used for the increment analysis.

CALPUFF was run using maximum 24-hour PM<sub>2.5</sub> fuel oil emissions from the Project and compared to the 24-hour PM<sub>2.5</sub> Class I SIL. If the 24-hour PM<sub>2.5</sub> impacts are below the 24-hour PM<sub>2.5</sub> SIL, no further modeling will be required. However, if the model predicts impacts at or above the 24-hour PM<sub>2.5</sub> modeling SIL, a cumulative PSD Class I increment analysis will be performed. The SIL and PSD Class I increments are shown in Table 5-1.

**Table 5-1: PM<sub>2.5</sub> 24-hour PSD Class I Increment and Significant Impact Levels**

Pollutant	Averaging Period	Class I Significant Impact Level	PSD Class I Increment
		micrograms per cubic meter (µg/m <sup>3</sup> )	
PM <sub>2.5</sub>	24-hour	0.07	2

Source: 40 Code of Federal Regulations (CFR) §51.166(c) and 40 CFR §52.21(k)(2), 1978

After examining the modeling results, it was determined that no exceedances of the PSD Class I modeling significance level occurred for the PM<sub>2.5</sub> 24-hour averaging period for fuel oil operation. The maximum modeled concentrations for each modeled Class I area are shown in Table 1-1 Table 5-2.

Given the modeled 24-hour PM<sub>2.5</sub> impacts from the Project, the Project is below the SIL and no further analysis will be conducted. Model input and output files for the deposition analysis have been provided on an external hard drive to the WVDEP.



**Table 5-2: PM<sub>2.5</sub> 24-hour Class I Significance Modeling Modeled Concentrations**

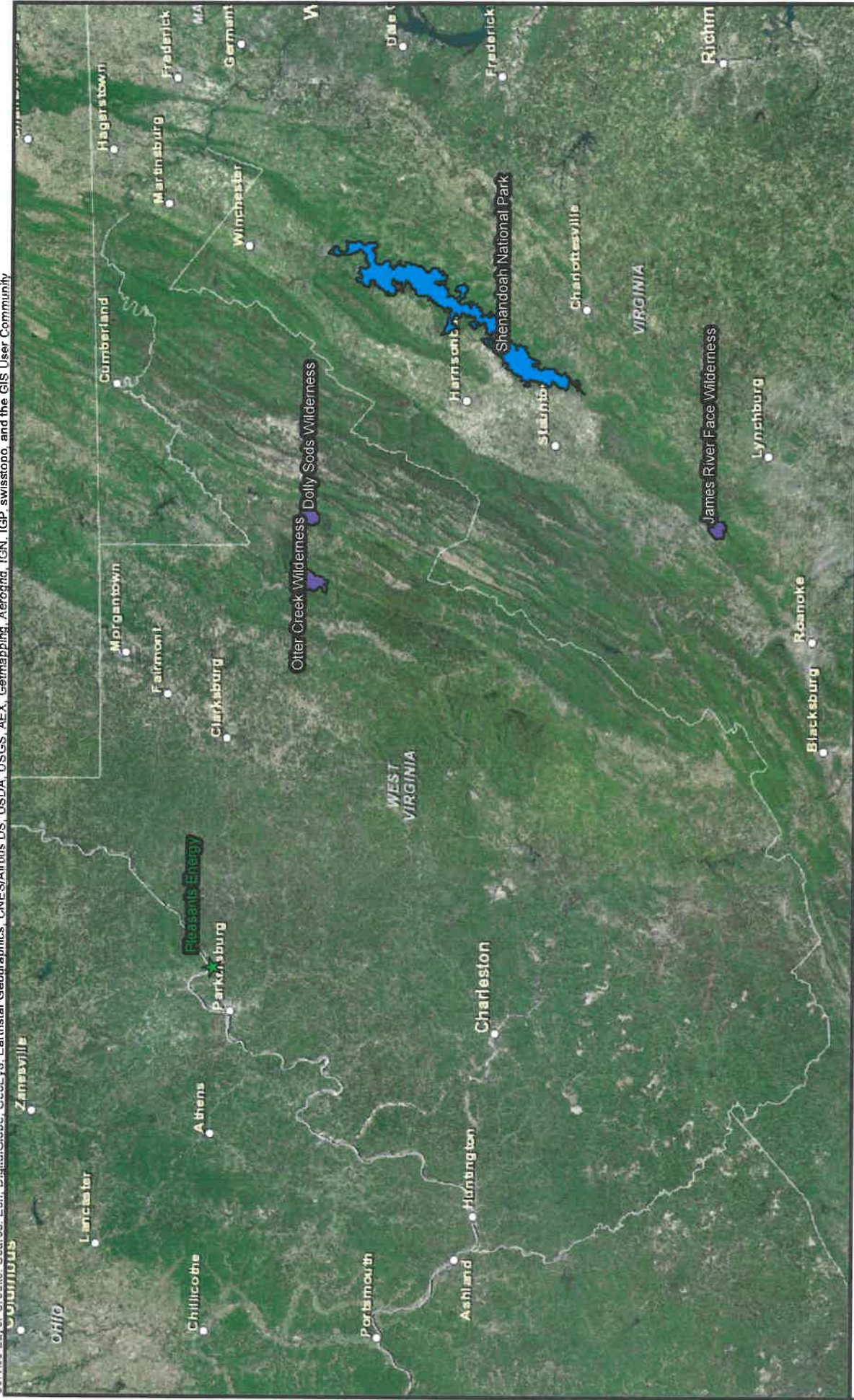
Class I Area	Year	X <sup>a</sup> (kilometers)	Y <sup>a</sup> (kilometers)	Maximum Concentration	Class I Significant Impact Level
				micrograms per cubic meter (µg/m <sup>3</sup> )	
James River Face Wilderness	2001	1,529.901	-119.397	0.0115	0.07
	2002	1,529.724	-118.492	0.0146	0.07
	2003	1,527.21	-120.862	0.0090	0.07
Otter Creek Wilderness	2001	1,478.905	33.097	0.0337	0.07
	2002	1,479.069	24.683	0.0342	0.07
	2003	1,479.243	23.778	0.0401	0.07

(a) Lambert conic conformal NWS-84

## 6.0 REFERENCES

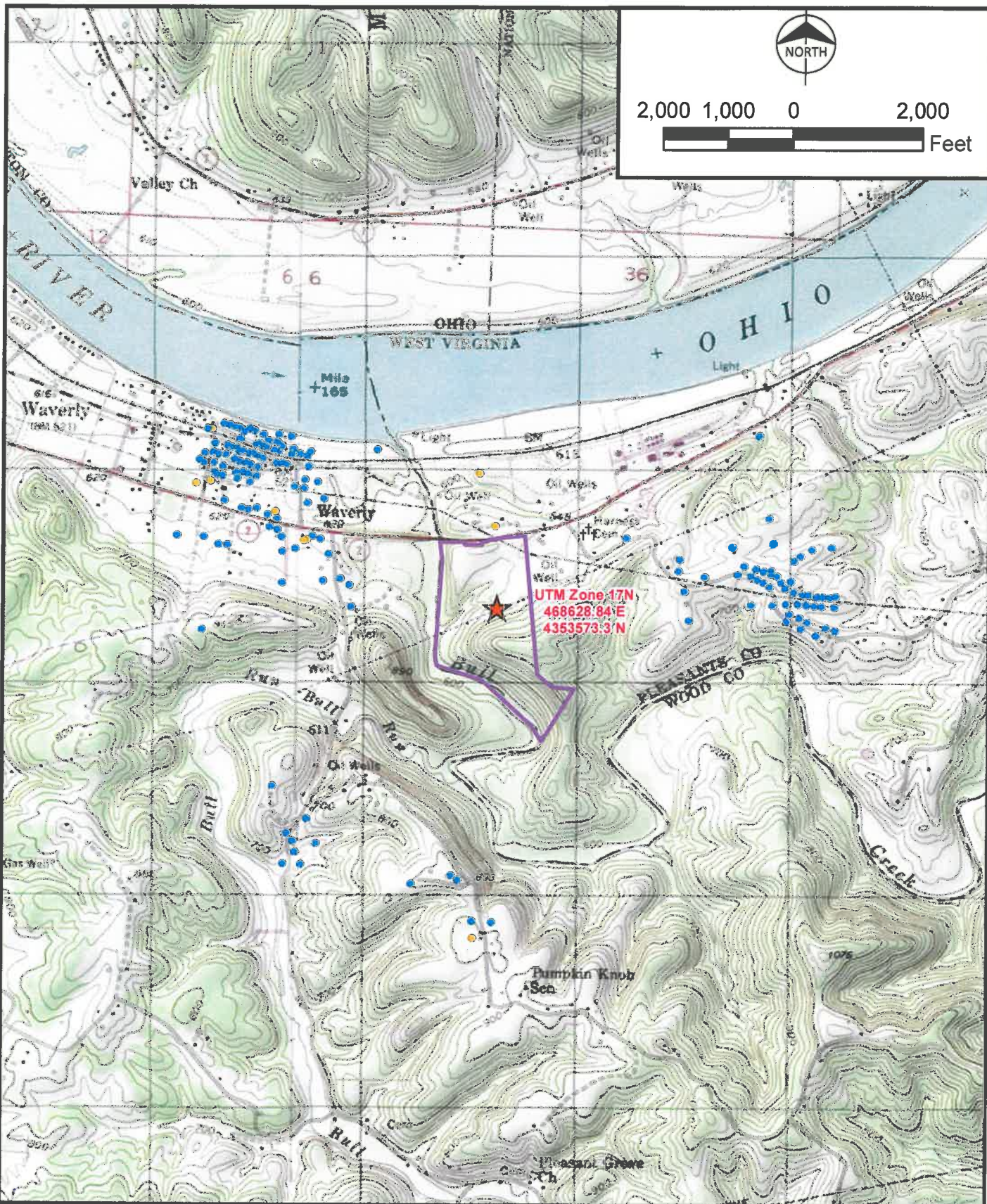
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- National Park Service. (no date). *Class I Receptors*. Retrieved 30 December 2015 from <http://www.nature.nps.gov/air/maps/receptors/>
- Scire, J.S., D.G. Strimaitis, and R.J. Yamartino. (2000a, January). *A User's Guide for the CALPUFF Dispersion Model (Version 5)*. Earth Tech, Inc.
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- U.S. Environmental Protection Agency. (1998, December). *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts*. EPA-454/R-98-019.
- U.S. Forest Service, National Park Service, and the U.S. Fish and Wildlife Service. (2010). *Federal Land Managers' Air Quality Related Values Workgroup (FLAG). Phase I Report – Revised (2010)*. Natural Resources Report NPS/NRPC/NRR-2010/232.
- 40 Code of Federal Regulations §51.166(c) and §52.21(k)(2) (June 19, 1978)

## **APPENDIX A – FIGURES**



<p>★ Pleasants Energy (Project Location)</p> <p>■ U.S. Forest Service Class I</p> <p>■ National Park Service Class I</p>	<p><b>BURNS McDONNELL</b></p> <p>Figure A-1 Project Location &amp; Class I Areas Pleasants Energy, LLC</p> <p>50 25 0 50 Kilometers</p> <p>Issued: 1/11/2016</p>
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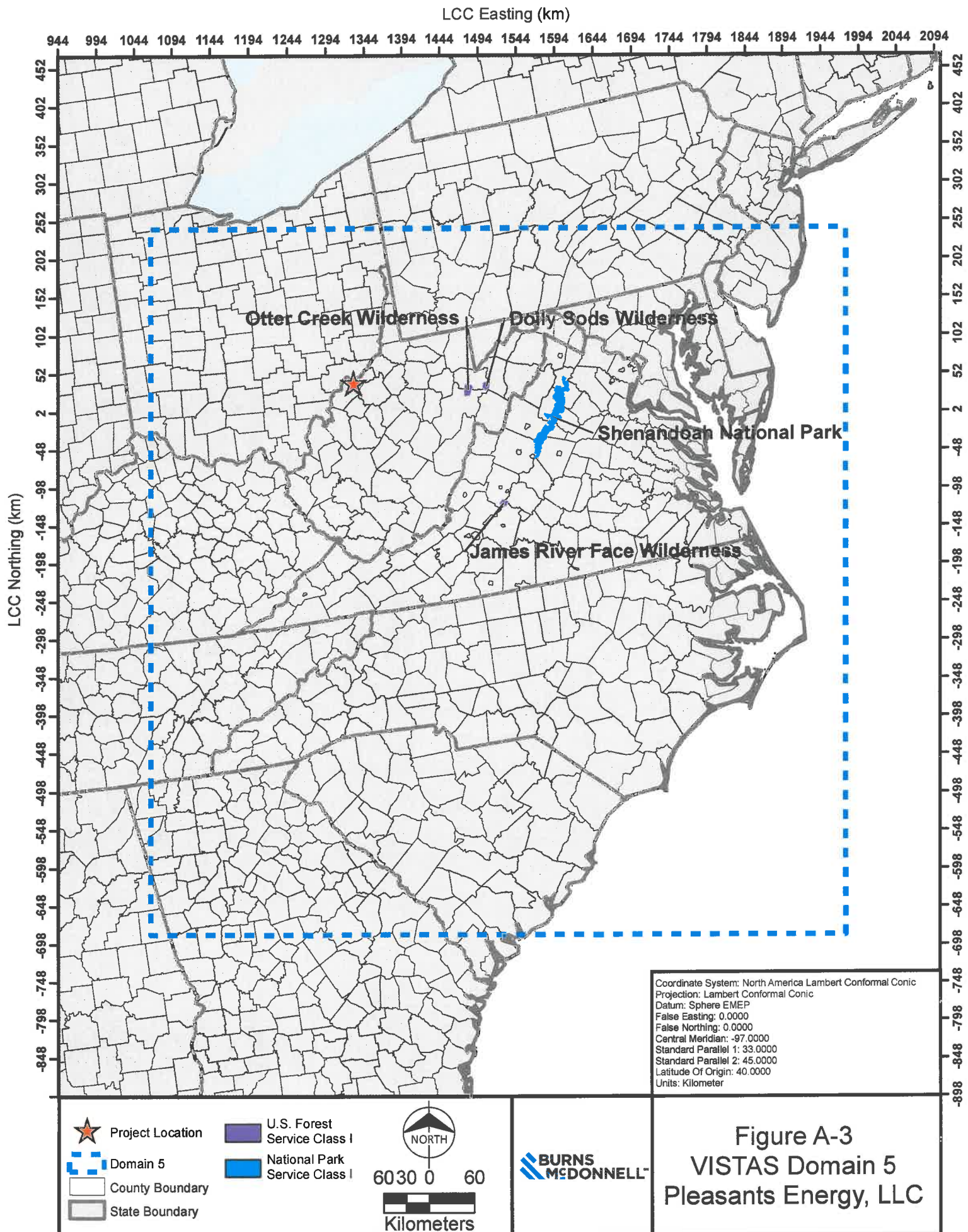
## Legend

- Business
- House
- ✠ Cemetery
- ★ Project Location
- Property Boundary

**BURNS  
MCDONNELL**

Figure A-2  
Area Map  
Pleasants Energy, LLC





**Figure A-3**  
**VISTAS Domain 5**  
**Pleasants Energy, LLC**

## **APPENDIX B – MODELING PROTOCOL**

# Prevention of Significant Deterioration Class I Increment Modeling Protocol

**Pleasants Energy, LLC**

**Pleasants Energy Facility  
Project No. 84344**

**January 2016**



# **Prevention of Significant Deterioration Class I Increment Modeling Protocol**

prepared for

**Pleasants Energy, LLC  
Pleasants Energy Facility  
Waverly, West Virginia**

**Project No. 84344**

**January 2016**

prepared by

**Burns & McDonnell Engineering Company, Inc.  
Kansas City, Missouri**

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**LIST OF ABBREVIATIONS**

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AIRS	Aerometric Information Retrieval System
AQRV	Air Quality Related Value
CASTNet	Clean Air Status and Trends Network
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
GT	gas turbine
$\text{HNO}_3$	nitric acid
IWAQM	Interagency Workgroup on Air Quality Modeling
K	Kelvin
lb/hr	pounds per hour
LCC	Lambert conic conformal
m/s	meters per second
MM5	Fifth-Generation Penn State/NCAR Mesoscale Model
MP	McElroy-Pooler
MW	megawatt
NCAR	National Center for Atmospheric Research
$\text{NO}_3$	nitrate
$\text{NO}_x$	nitrogen oxides

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
NPS	National Park Service
PG	Pasquill-Gifford
Pleasants Energy	Pleasants Energy, LLC
PM <sub>10</sub>	particulate matter less than 10 microns in diameter
PM <sub>2.5</sub>	particulate matter less than 2.5 microns in diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
SCF	standard cubic feet
SCF/yr	standard cubic feet per year
SIL	Significant Impact Level
SO <sub>2</sub>	sulfur dioxide
SO <sub>4</sub>	sulfate
UTM	Universal Transverse Mercator
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
WVDEP	West Virginia Department of Environmental Protection

## 1.0 INTRODUCTION

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The locations of the Project and the four Class I areas listed above are shown in Figure A-1 in Appendix A.

As an initial screening effort to determine if further analysis is required for the Class I increment analysis, modeled impacts at receptors placed 50 kilometers in the direction of each Class I area were compared to the Class I Significant Impact Level (SIL) using AERMOD. Both the minimum and maximum receptor elevations at each of the respective Class I areas were modeled and are shown in Table 1-1. The maximum modeled impacts at the 50 kilometer edge of the AERMOD grid in comparison to the Class I SIL are shown in Table 1-2. The preliminary screening analysis showed that the 24-hour  $PM_{2.5}$  fuel oil impacts potentially exceed the 24-hour Class I  $PM_{2.5}$  SIL for Otter Creek Wilderness and James River Face Wilderness at 50 kilometers from the Project in the direction of these Class I areas. For all other averaging periods and pollutants, the screening modeling showed that the Project will not significantly impact the four Class I areas that are within 300 kilometers of the Project, and no further analysis is required.

Table 1-1: AERMOD Class I Receptor Coordinates and Elevations

Class I Area	UTM Coordinates <sup>a</sup>		Maximum Elevation (meters)	Minimum Elevation (meters)	Hill Height (meters)
	Easting (meters)	Northing (meters)			
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(a) UTM = Universal Transverse Mercator: North American Datum 83

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Pollutant	Averaging Time	Maximum Modeled value at 50 kilometer Receptor ( $\mu\text{g}/\text{m}^3$ ) <sup>b,c</sup>				Class I Significant Impact Level ( $\mu\text{g}/\text{m}^3$ ) <sup>c</sup>
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Source: 40 Code of Federal Regulations (CFR) §52.21(k)(2), 1978

(a) Modeled as NO<sub>x</sub>

(b) Numbers in bold indicate the Class I significant impact level is exceeded

(c)  $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter

Because PM<sub>2.5</sub> 24-hour PSD Class I increment screening impacts were not below the SIL 50 kilometers from the site, a PSD Class I increment analysis using CALPUFF will be performed for Otter Creek Wilderness and James River Face Wilderness to assess the impacts of fuel oil operation.

Submittal of this protocol will allow the West Virginia Department of Environmental Protection (WVDEP) to review and comment upon the methodology to be employed in the preparation of the Class I increment modeling analysis.

Included in this document is a brief description of the Project, proposed model to be used, modeling methodologies, and model input parameters. Draft CALPUFF and CALPOST input files will be submitted with this protocol for review and comment. This Class I increment modeling protocol has been drafted in accordance with guidance from the EPA, Federal Land Manager (FLM), and WVDEP modeling guidelines.

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Pleasants Energy plans to increase the hours of operation of its two simple-cycle General Electric 7FA combustion turbines at the Pleasants Energy facility located near Waverly, West Virginia. The facility currently operates under Title V permit number R30-07300022-2014. The facility is located in Pleasants County, which is currently designated as an attainment/unclassified area for all criteria pollutants in 40 Code of Federal Regulations (CFR) Part 81. The location of the Pleasants Energy site is shown in Figure A-2 in Appendix A.

The combustion turbines operate in simple-cycle mode only to generate electricity. The combustion turbines will be permitted with restricted operation. The turbines will have a combined  $\text{NO}_x$  limit of 464.6 tons per year, with compliance shown via continuous emission monitors. Additionally, the combustion turbines will be limited to 16.5 tons per year of  $\text{SO}_2$  emissions on an annual basis based on 15 parts per million (ppm) sulfur diesel fuel. For all other pollutants, the turbines will have an overall fuel usage limit for both combustion turbines combined of 19,081,721,569 standard cubic feet per year (SCF/year) which includes both fuel oil and natural gas. When fuel oil is combusted, it will be equal to 889 standard cubic feet (SCF) for every gallon combusted. This fuel limit methodology is consistent with Pleasants Energy's current minor source permit limitation.

Each of the combustion turbines is currently permitted to operate with TurboPhase. The TurboPhase systems increase the output of each of the existing combustion turbines up to approximately 18 megawatts (MW) by injecting externally supplied air into the combustion turbine after compressor discharge at the inlet to the combustor. This increases mass flow through the turbines and generator output. Therefore, maximum emissions occur when TurboPhase is operating on the combustion turbines.

The Project emission units, emission unit sizes, number of units, and fuels combusted are displayed in Table 2-1.



**Table 2-1: Project Emission Units and Approximate Operation Estimates**

<b>Emissions Unit</b>	<b>Size<sup>a,b</sup></b>	<b>Number of Units</b>	<b>Fuel</b>	<b>Estimated Operation</b>
Combustion turbine	191.2 MW (natural gas) 196.9 MW (fuel oil)	2	Natural gas	19,081,721,569 SCF/year both turbines combined <sup>a,c</sup>
			Fuel oil	
			Natural gas	365 start-ups and shutdowns (each) <sup>d</sup>
			Fuel oil	20 start-ups and shutdowns (each) <sup>d</sup>

(a) MW = megawatt, SCF/year = standard cubic feet per year

(b) Output is increased by 18 MW when TurboPhase is operating.

(c) The standard cubic feet (SCF) limit includes both fuel oil and natural gas where fuel oil usage equals 889 SCF for every gallon combusted.

(d) One start-up is limited to 2 hours and one shutdown is limited to 1 hour each.

### 3.0 PROPOSED MODEL

CALPUFF and its meteorological model CALMET, are designed to handle complex terrain, the long source to receptor distances, chemical transformation and deposition, and other issues related to Class I impacts. The CALPUFF modeling system has been adopted by the EPA as a guideline model for long-range transport (source to receptor distances of 50 kilometers or more), and for use on a case-by-case basis in complex flow for shorter distances. CALPUFF is recommended for Class I impact assessments by the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) and the Interagency Workgroup on Air Quality Modeling (IWAQM).

Pleasants Energy is proposing to use the following EPA-approved versions of the CALPUFF modeling system for the Class I increment modeling (Exponent, no date):

- CALMET Version 5.8.4, Level 130731
- CALPUFF Version 5.8.4, Level 130731
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#### 3.1 Modeling Domain

The Visibility Improvement State and Tribal Association of the Southeast (VISTAS) is the regional consortium of Federal, state, local, and tribal organizations formed to “address regional haze and visibility problems in the southeastern United States.” The VISTAS Domain 5 data will be used for the modeling domain.

The specifications for VISTAS Domain 5 are shown in Table 3-1.

**Table 3-1: Class I Modeling Domain Specifications**

Domain	Southwest Coordinates	Number of X Grid Cells	Number of Y Grid Cells	Horizontal Grid Spacing (kilometers)
VISTAS Domain 5	NWS-84 X coordinate = 1,066.005 kilometers Y coordinate = -686.004 kilometers	228	232	4

The VISTAS Domain 5 is 912 by 928 kilometers. Ten vertical levels were used. The cell face heights are located at 0, 20, 40, 80, 160, 320, 640, 1,200, 2,000, 3,000, and 4,000 meters.

The Lambert conformal conic (LCC) projection system will be used for the CALMET/CALPUFF modeling domain to account for the Earth's curvature. The LCC grid projection will match the Fifth-

Generation Penn State/National Center for Atmospheric Research (NCAR) Mesoscale Model (MM5) data.

### 3.2 Receptors

The National Park Service (NPS) database of modeling receptors for Class I areas was downloaded from the NPS website (NPS, no date) and will be used for this analysis for each of the Class I areas being modeled. The receptor data will use the LCC projection system.

### 3.3 CALMET

CALMET is a diagnostic meteorological model that produces three-dimensional wind and temperature fields and two-dimensional fields of mixing heights and other meteorological fields. It contains slope flow effects, terrain channeling, and kinematic effects of terrain.

One of the products of VISTAS was the development of a standardized CALMET gridded wind field for use in long-range transport of pollutants. Therefore, processed and approved CALMET VISTAS Domain 5 will be used for this analysis. The processed data includes 3 years of hourly output data (2001, 2002 and 2003) in the LCC projection coordinate system. A summary of major characteristics of the CALMET model is outlined in the CALMET User's Guide (Scire, 2000b).

### 3.4 CALPUFF

CALPUFF is a non-steady state model that includes algorithms for building downwash effects as well as chemical transformation, wet deposition, and dry deposition. CALPUFF can combine effects of terrain, dry and wet deposition, and overwater dispersion to predict pollutants' impacts.

The CALPUFF simulations will be conducted for the years 2001 to 2003 using the following model options:

- Gaussian distribution
- Partial plume path adjustment for terrain
- Transitional plume rise
- Stack tip downwash
- Wet deposition, dry deposition, and chemical transformation using the MESOPUFF II scheme
- Pasquill-Gifford (PG) dispersion coefficients (rural areas), McElroy-Pooler (MP) dispersion coefficients (urban areas)

Deposition and transformation effects will be modeled using the default dry deposition model, the scavenging coefficient wet removal module, and the default MESOPUFF II chemical transformation mechanism. The major features and options of the CALPUFF model are outlined in the CALPUFF User's Guide (Scire, 2000a).

The FLM's CALPUFF Reviewer's Guide will be followed as a guide for this analysis (Anderson, 2011).

#### **3.4.1 Ozone Background Data**

Hourly measured ozone concentrations provided in an external "ozone.dat" file were based on VISTAS datasets and will be used for the analysis. Data from the EPA Aerometric Information Retrieval System (AIRS) and Clean Air Status and Trends Network (CASTNet) were used to develop the hourly ozone data file.

#### **3.4.2 Ammonia Background Data**

A constant ammonia concentration of 10 parts per billion will be assumed for all CALPUFF modeling runs. This concentration will be specified in the CALPUFF input file.

## 4.0 SITE-SPECIFIC MODELING DATA

The Project-specific source emissions and stack parameters used in the modeling analysis are explained in detail in this chapter.

The 24-hour maximum emission rate for fuel oil will be modeled for the PM<sub>2.5</sub> increment analysis. The detailed emissions calculations that demonstrate how the emission rates were obtained are shown in Appendix B.

The fuel oil short-term rates will be modeled with 100 percent load fuel oil operation stack parameters, since it is the predominant maximum emission rate for a 24-hour period. All emissions and stack parameters are shown in Table 4-1.

**Table 4-1: Combustion Turbine Emissions and Modeling Parameters – per Turbine**

Pollutant	Fuel Oil 24-hour Maximum Emission Rate
PM <sub>2.5</sub>	39.00 lb/hr (4.91 g/s) <sup>a</sup>
<b>Stack Parameters</b>	
X GT1/GT2 (kilometers) <sup>a, b</sup>	1,334.16/1,334.21
Y GT1/GT2 (kilometers) <sup>a, b</sup>	41.42/41.44
Base elevation (meters)	198.12
Stack temperature (K) <sup>a</sup>	883.71
Exit velocity (m/s) <sup>a</sup>	45.17
Stack height (meters)	34.90
Stack diameter (meters)	5.49

(a) lb/hr = pound per hour; g/s = grams per second; K = Kelvin; m/s = meters per second; GT = gas turbine

(b) Lambert conic conformal NWS-84

The size distribution is shown in Table 4-2.

**Table 4-2: Size Distribution for Oil-Fired Combustion Turbines**

Modeled Species Name	Size Distribution (%)	Median Diameter (microns)	Geometric Standard Deviation (microns)
PM <sub>2.5</sub>	100	3.00	2.00

## 5.0 CLASS I INCREMENT ANALYSIS

The IWAQM developed a set of procedures for use in evaluating increment impacts (EPA, 1998) that are referenced in the FLAG Phase I Report – Revised (2010) (FLAG 2010) on assessing AQRV in Class I areas (USFS, NPS, and USFWS, 2010). The methodologies listed in FLAG 2010 and FLM’s CALPUFF Reviewer’s Guide will be used for the increment analysis.

CALPUFF will be run using maximum 24-hour  $PM_{2.5}$  fuel oil emissions from the Project and compared to the 24-hour  $PM_{2.5}$  Class I SIL. If the 24-hour  $PM_{2.5}$  impacts are below the 24-hour  $PM_{2.5}$  SIL, no further modeling will be required. However, if the model predicts impacts at or above the 24-hour  $PM_{2.5}$  modeling SIL, a cumulative PSD Class I increment analysis will be performed. The SIL and PSD Class I increments are shown in Table 5-1.

**Table 5-1:  $PM_{2.5}$  24-hour PSD Class I Increment and Significant Impact Levels**

Pollutant	Averaging Period	Class I Significant Impact Level	PSD Class I Increment
		micrograms per cubic meter ( $\mu g/m^3$ )	
$PM_{2.5}$	24-hour	0.07	2

Source: 40 Code of Federal Regulations (CFR) §51.166(c) and 40 CFR §52.21(k)(2), 1978

## **6.0 INPUT FILES AND CONCURRENCE**

This modeling protocol is being submitted to WVDEP for approval prior to finalizing the Class I increment modeling for the Project. Included with this protocol are CALPUFF and CALPOST input files for review and comment.

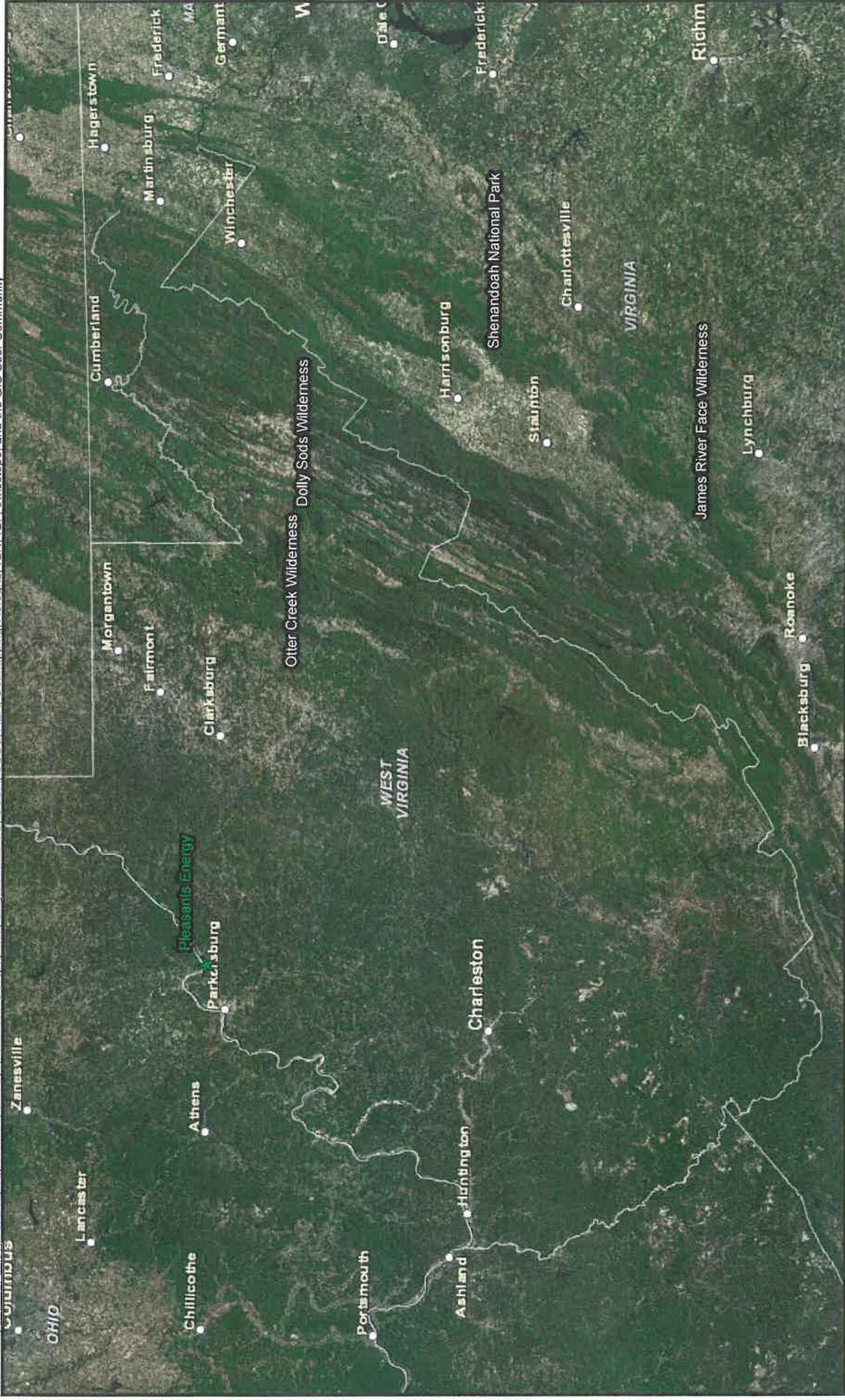
Once discussion and concurrence on the modeling methodologies are finalized, the final increment modeling will be performed and final report will be submitted to WVDEP.

## 7.0 REFERENCES

- Anderson, Bret. (updated 2011, May 23). *Federal Land Manager's CALPUFF Review Guide*. USDA Forest Service. [Original prepared by: Howard Gebhart, Air Resource Specialists, Inc.]
- Exponent Engineering and Scientific Consulting. (no date). *Codes & Related Processors: USEPA-Approved Version*. Retrieved 30 December 2015 from [http://www.src.com/calpuff/download/epa\\_codes.htm](http://www.src.com/calpuff/download/epa_codes.htm)
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- U.S. Environmental Protection Agency. (1998, December). *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts*. EPA-454/R-98-019.
- U.S. Forest Service, National Park Service, and the U.S. Fish and Wildlife Service. (2010). *Federal Land Managers' Air Quality Related Values Workgroup (FLAG). Phase I Report – Revised (2010)*. Natural Resources Report NPS/NRPC/NRR-2010/232.
- 40 Code of Federal Regulations §51.166(c) and §52.21(k)(2) (June 19, 1978)



## APPENDIX A - FIGURES



- ★ Pleasants Energy (Project Location)
- USFS Class I
- NPS Class I

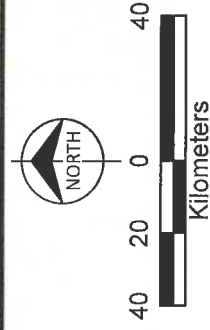
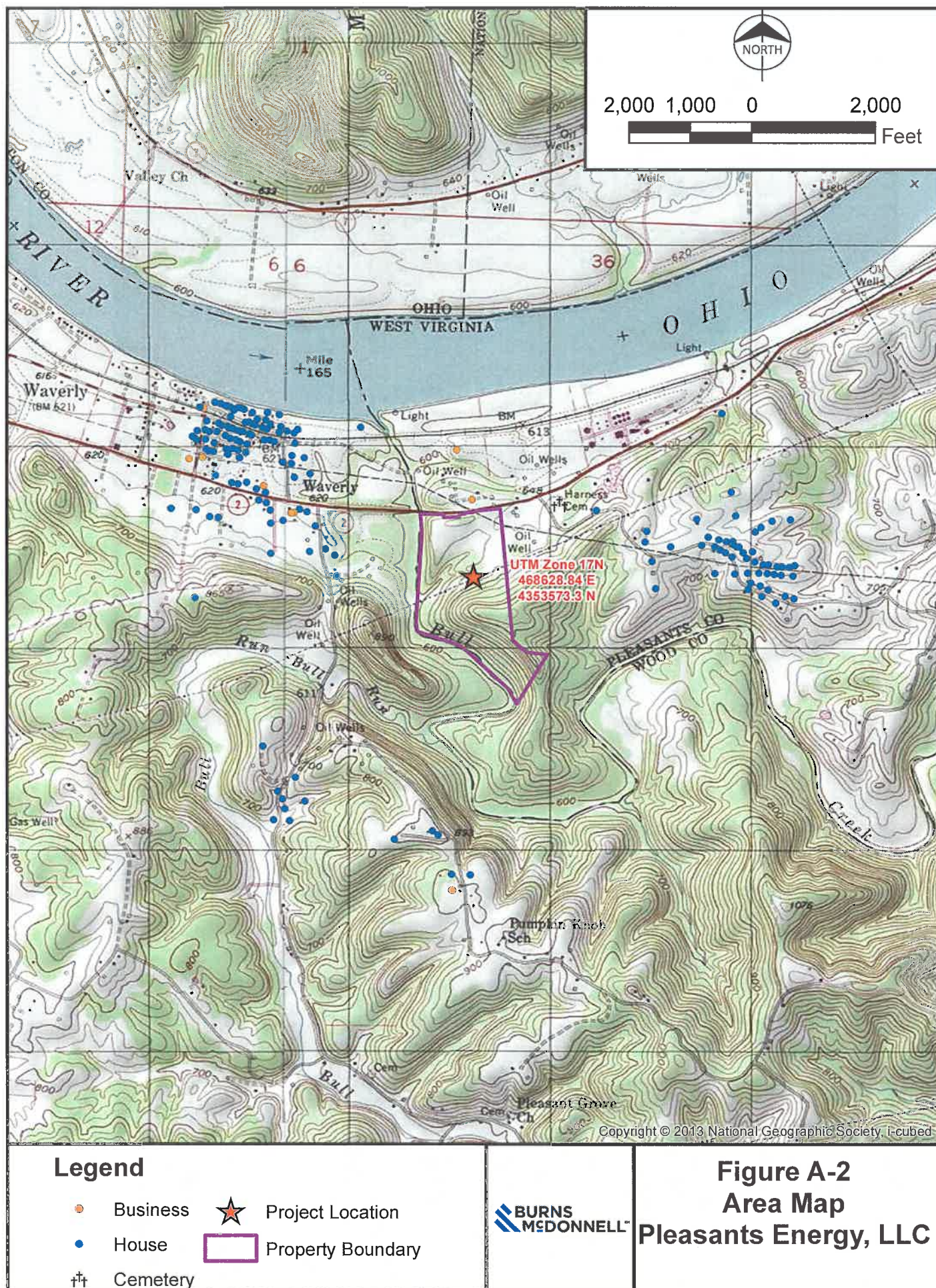


Figure A-1  
 Project Location & Class I Areas  
 Pleasants Energy, LLC







## **APPENDIX B – EMISSIONS CALCULATIONS**

**Pleasants Energy, LLC - PSD Project**  
**Fuel Oil Potential Emissions for Turbines 1 & 2**  
**24-hour Emission Rates for Increment Analysis**

GT1 & GT2 combustion turbine size	1,570	MMBtu/hr
Number of combustion turbines (GT1 & GT2)	2	
Number of fuel oil starts per turbine	20	
Fuel oil (#2) heating value	0.14	MMBtu/gal
Fuel consumption rate	11,214	gal/hr

**Fuel Oil Operation Emissions**

Pollutant	100% Load Fuel Oil Emission Rate (lb/hr)	Start-up Emissions (lb/hr) <sup>a</sup>	Shutdown Emissions (lb/hr) <sup>b</sup>	Maximum 24-hour Emissions (lb/hr) <sup>c</sup>
PM <sub>2.5</sub>	39	39.0	39.0	39.0

(a) Assumes start-up is 120 minutes

(b) Assumes shutdown is 60 minutes

(c) Emissions are based on 1 start-up and 1 shutdown per day



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## **APPENDIX C – EMISSIONS CALCULATIONS**

**Pleasants Energy, LLC - PSD Project**  
**Fuel Oil Potential Emissions for Turbines 1 & 2**  
**24-hour Emission Rates for Increment Analysis**

GT1 & GT2 combustion turbine size	1,570	MMBtu/hr
Number of combustion turbines (GT1 & GT2)	2	
Number of fuel oil starts per turbine	20	
Fuel oil (#2) heating value	0.14	MMBtu/gal
Fuel consumption rate	11,214	gal/hr

**Fuel Oil Operation Emissions**

Pollutant	100% Load		Shutdown Emissions (lb/hr) <sup>b</sup>	Maximum	
	Fuel Oil Emission Rate (lb/hr)	Start-up Emissions (lb/hr) <sup>a</sup>		24-hour Emissions <sup>c</sup> (lb/hr)	(g/s)
PM <sub>2.5</sub>	39	39.0	39.0	39.0	4.9

(a) Assumes start-up is 120 minutes

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(c) Emissions are based on 1 start-up and 1 shutdown per day





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# Prevention of Significant Deterioration Class I Visibility and Deposition Modeling Report

**Pleasants Energy, LLC**

**Pleasants Energy Facility  
Project No. 84344**

**March 2016**

# **Prevention of Significant Deterioration Class I Visibility and Deposition Modeling Report**

prepared for

**Pleasants Energy, LLC  
Pleasants Energy Facility  
Waverly, West Virginia**

**Project No. 84344**

**March 2016**

prepared by

**Burns & McDonnell Engineering Company, Inc.  
Kansas City, Missouri**

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**LIST OF ABBREVIATIONS**

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
$\mu\text{g}/\text{m}^2/\text{s}$	micrograms per square meter per second
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AIRS	Aerometric Information Retrieval System
AQRV	Air Quality Related Value
CASTNet	Clean Air Status and Trends Network
CFR	Code of Federal Regulations
CM	coarse mass
DAT	Deposition Analysis Threshold
EC	elemental carbon
EPA	U.S. Environmental Protection Agency
$f_L(\text{RH})$	relative humidity adjustment factor for large sulfate and nitrate
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
$f_s(\text{RH})$	relative humidity adjustment factor for small sulfate and nitrate
$f_{ss}(\text{RH})$	relative humidity adjustment factor for sea salt
GT	gas turbine
$\text{HNO}_3$	nitric acid
IWAQM	Interagency Workgroup on Air Quality Modeling
K	Kelvin
$\text{kg}/\text{ha}/\text{yr}$	kilogram per hectare per year
lb/hr	pounds per hour

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
LCC	Lambert conic conformal
m/s	meters per second
Mm <sup>-1</sup>	inverse megameters
MM5	Fifth-Generation Penn State/NCAR Mesoscale Model
MP	McElroy-Pooler
MW	megawatt
N	nitrogen
NCAR	National Center for Atmospheric Research
NH <sub>4</sub> NO <sub>3</sub>	ammonium nitrate
(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	ammonium sulfate
NO <sub>3</sub>	nitrate
NO <sub>x</sub>	nitrogen oxides
NPS	National Park Service
OC	organic carbon
OM	organic mass
PG	Pasquill-Gifford
Pleasants Energy	Pleasants Energy, LLC
PM <sub>10</sub>	particulate matter less than 10 microns in diameter
PM <sub>2.5</sub>	particulate matter less than 2.5 microns in diameter
PMC	coarse particulate matter
PMF	fine particulate matter
ppm	parts per million

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
PSD	Prevention of Significant Deterioration
RHMAX	maximum relative humidity
S	sulfur
SCF	standard cubic feet
SCF/yr	standard cubic feet per year
SO <sub>2</sub>	sulfur dioxide
SO <sub>4</sub>	sulfate
SOA	secondary organic aerosol
ULSD	ultra-low sulfur diesel
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
WVDEP	West Virginia Department of Environmental Protection



## 1.0 INTRODUCTION

Pleasants Energy, LLC (Pleasants Energy), located near Waverly within Pleasants County, West Virginia, installed two simple-cycle General Electric 7FA combustion turbines at the Pleasants Energy facility in 2001, under permit number R13-2373, with an administrative amendment in 2006 (R13-2373A). The permit had operational restrictions to limit the facility's potential to emit to less than 250 tons per year of any criteria pollutant so the facility could be minor for Prevention of Significant Deterioration (PSD). Pleasants Energy submitted a PSD air construction permit application in September 2015 to increase the hours of operation of the combustion turbines (hereafter referred to as Project). Since the Project will lift the synthetic minor limitation on the combustion turbines and will increase emissions to greater than 250 tons per year, this Project is subject to PSD.

Recent Federal Land Manager (FLM) guidance recommends that a proposed major source, in the course of a PSD application, perform an assessment of air quality impacts at Class I areas if these areas are located within 300 kilometers of the proposed facility. There are four Class I areas that are within 300 kilometers of the Project:

- Otter Creek Wilderness (130 kilometers)
- Dolly Sods Wilderness (160 kilometers)
- Shenandoah National Park (200 kilometers)
- James River Face Wilderness (253 kilometers)

The use of the Screening Procedure (Q/D) to determine if the Project could opt (screen) out of an Air Quality Related Value (AQRV) assessment for visibility and deposition with CALPUFF was initially performed. Although overall turbine emissions are limited on a tons per year basis for nitrogen oxides (NO<sub>x</sub>) and sulfur dioxide (SO<sub>2</sub>) and on a fuel usage limit, per guidance from the FLMs, the maximum 24-hour emission rate must be used and ratioed for 365-day operation to determine the "Q" value when assessing the need for a full visibility analysis. When using the maximum 24-hour rate for fuel oil, the Q/D for the Project is greater than 10 for all Class I areas within 300 kilometers; therefore, an AQRV analysis is required.

Therefore, a visibility and deposition analysis was performed for each of the four Class I areas that are within a 300-kilometer radius of the Project site. The locations of the Project and the four Class I areas listed above are shown in Figure A-1 in Appendix A.

A Class I visibility and deposition modeling protocol was submitted to the West Virginia Department of Environmental Protection (WVDEP) and FLMs in January 2016 (Appendix B). The protocol presented Class I visibility and deposition modeling parameters to be used in developing the AQRV analysis for the Project. The protocol allowed the WVDEP and FLMs to review and comment upon the methodology to be employed in the Class I visibility and deposition modeling analyses and concurrence on the modeling methodologies was received from the FLMs and WVDEP.

Included in this document is a brief description of the Project, model to be used, modeling methodologies, and model input parameters. This Class I visibility and deposition modeling report and modeling has been drafted in accordance with guidance from the FLM modeling guidelines.

## 2.0 PROJECT DESCRIPTION

Pleasants Energy plans to increase the hours of operation of its two simple-cycle General Electric 7FA combustion turbines at the Pleasants Energy facility located near Waverly, West Virginia. The facility currently operates under Title V permit number R30-07300022-2014. The facility is located in Pleasants County, which is currently designated as an attainment/unclassified area for all criteria pollutants in 40 Code of Federal Regulations (CFR) Part 81. The location of the Pleasants Energy site is shown in Figure A-2 in Appendix A.

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Each of the combustion turbines is currently permitted to operate with TurboPhase. The TurboPhase systems increase the output of each of the existing combustion turbines up to approximately 18 megawatts (MW) by injecting externally supplied air into the combustion turbine after compressor discharge at the inlet to the combustor. This increases mass flow through the turbines and generator output. Therefore, maximum emissions occur when TurboPhase is operating on the combustion turbines.

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			Fuel oil	
			Natural gas	365 start-ups and shutdowns (each) <sup>d</sup>
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(a) MW = megawatt, SCF/year = standard cubic feet per year

(b) Output is increased by 18 MW when TurboPhase is operating.

(c) The standard cubic feet (SCF) limit includes both fuel oil and natural gas where fuel oil usage equals 889 SCF for every gallon combusted.

(d) One start-up is limited to 2 hours, and one shutdown is limited to 1 hour each.

### 3.0 PROPOSED MODEL

CALPUFF and its meteorological model CALMET, are designed to handle complex terrain, the long source-to-receptor distances, chemical transformation and deposition, and other issues related to Class I impacts. The CALPUFF modeling system has been adopted by the EPA as a guideline model for long-range transport (source to receptor distances of 50 kilometers or more), and for use on a case-by-case basis in complex flow for shorter distances. CALPUFF is recommended for Class I impact assessments by the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) and the Interagency Workgroup on Air Quality Modeling (IWAQM).

Pleasants Energy is proposing to use the following EPA-approved versions of the CALPUFF modeling system for the visibility and deposition modeling (Exponent, no date):

- CALMET Version 5.8.4, Level 130731
- CALPUFF Version 5.8.4, Level 130731
- POSTUTIL Version 1.56, Level 070627
- CALPOST Version 6.221, Level 080724

#### 3.1 Modeling Domain

The Visibility Improvement State and Tribal Association of the Southeast (VISTAS) is the regional consortium of Federal, state, local, and tribal organizations formed to “address regional haze and visibility problems in the southeastern United States.” The VISTAS Domain 5 data was used for the modeling domain and is shown in Figure A-3 in Appendix A. The domain covered all Class I areas analyzed as well as the Pleasants Energy facility, therefore no additional grid cells were required to be added to the Domain 5 dataset.

The specifications for VISTAS Domain 5 are shown in Table 3-1.

**Table 3-1: Class I Modeling Domain Specifications**

Domain	Southwest Coordinates	Number of X Grid Cells	Number of Y Grid Cells	Horizontal Grid Spacing (kilometers)
VISTAS Domain 5	NWS-84 X coordinate = 1,066.005 kilometers Y coordinate = -686.004 kilometers	228	232	4

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The Lambert conformal conic (LCC) projection system was used for the CALMET/CALPUFF modeling domain to account for the Earth's curvature. The LCC grid projection matches the Fifth-Generation Penn State/National Center for Atmospheric Research (NCAR) Mesoscale Model (MM5) data.

### **3.2 Receptors**

The National Park Service (NPS) database of modeling receptors for Class I areas was downloaded from the NPS website (NPS, no date-a) and was used for this analysis for each of the Class I areas being modeled. The receptor data uses the LCC projection system.

### **3.3 CALMET**

CALMET is a diagnostic meteorological model that produces three-dimensional wind and temperature fields and two-dimensional fields of mixing heights and other meteorological fields. It contains slope flow effects, terrain channeling, and kinematic effects of terrain.

One of the products of VISTAS was the development of a standardized CALMET gridded wind field for use in long-range transport of pollutants. Therefore, processed and approved CALMET VISTAS Domain 5 was used for this analysis. The processed data includes 3 years of hourly output data (2001, 2002, and 2003) in the LCC projection coordinate system. A summary of major characteristics of the CALMET model is outlined in the CALMET User's Guide (Scire, 2000b).

### **3.4 CALPUFF**

CALPUFF is a non-steady state model that includes algorithms for building downwash effects as well as chemical transformation, wet deposition, and dry deposition. CALPUFF can combine effects of terrain, dry and wet deposition, and overwater dispersion to predict pollutants' impacts.

The CALPUFF simulations were conducted for the years 2001 to 2003 using the following model options:

- Gaussian distribution
- Partial plume path adjustment for terrain
- Transitional plume rise
- Stack tip downwash
- Wet deposition, dry deposition, and chemical transformation using the MESOPUFF II scheme

- Pasquill-Gifford (PG) dispersion coefficients (rural areas), McElroy-Pooler (MP) dispersion coefficients (urban areas)

Deposition and transformation effects were modeled using the default dry deposition model, the scavenging coefficient wet removal module, and the default MESOPUFF II chemical transformation mechanism. The major features and options of the CALPUFF model are outlined in the CALPUFF User's Guide (Scire, 2000a).

The FLM's CALPUFF Reviewer's Guide was followed as a guide for this analysis (Anderson, 2011).

### **3.4.1 Ozone Background Data**

Hourly measured ozone concentrations provided in an external "ozone.dat" file were based on VISTAS datasets and was used for the analysis. Data from the EPA Aerometric Information Retrieval System (AIRS) and Clean Air Status and Trends Network (CASTNet) were used to develop the hourly ozone data file.

### **3.4.2 Ammonia Background Data**

A conservative constant ammonia concentration of 10 parts per billion was assumed for all CALPUFF modeling runs. This concentration was specified in the CALPUFF input file. The ammonia limiting method was not used as a post processing step in POSTUTIL (MNITRATE = 0 and NH3TPY = 0). The use of ALM is not a critical parameter for determining visibility impacts for this project and the project visibility impacts are low. Based on research and tests, it was determined that using ALM will not alter the visibility results in any significant way.

## **4.0 SITE-SPECIFIC MODELING DATA**

The Project-specific source emissions, stack parameters, and particulate matter speciation used in the modeling analysis are explained in detail in this chapter.

### **4.1 Source Emissions and Stack Parameters**

Two operating scenarios were modeled for the visibility analysis: maximum 24-hour fuel oil operations and maximum 24-hour natural gas operations which includes start-up and shutdowns. For deposition modeling, the maximum annual emission rates, based on ton per year and fuel limitations were modeled. The detailed emissions calculations that demonstrate how the emission rates were obtained are shown in Appendix C.

Predominant stack parameters were used in the modeling analyses for the 24-hour and annual modeling analyses. The fuel oil short-term rates were modeled with 100 percent load fuel oil operation stack parameters, and the natural gas short-term rates were modeled with 100 percent load with TurboPhase natural gas operation stack parameters, since these are the predominant maximum emission rates for a 24-hour period. For deposition modeling, the maximum annual emission rates were modeled with 100 percent load fuel oil operation stack parameters since these parameters are worst-case. All emissions and stack parameters are shown in Table 4-1.



**Table 4-1: Combustion Turbine Emissions and Modeling Parameters – per Turbine**

Pollutant	Natural Gas 24-hour Maximum Emission Rate for Visibility Modeling	Fuel Oil 24-hour Maximum Emission Rate for Visibility Modeling	Natural Gas/Fuel Oil Annual Maximum Emission Rate for Deposition Modeling
	pounds per hour (lb/hr)		
NO <sub>x</sub>	90.08 <sup>a</sup>	480.68 <sup>b</sup>	53.04 <sup>c</sup>
SO <sub>2</sub> <sup>d</sup>	2.80	3.09	1.88 <sup>c</sup>
PM <sub>10</sub> /PM <sub>2.5</sub>	20.20	39.00	-
<b>Stack Parameters</b>			
X GT1/GT2 (kilometers) <sup>e, f</sup>	1,334.16/1,334.21	1,334.16/1,334.21	1,334.16/1,334.21
Y GT1/GT2 (kilometers) <sup>e, f</sup>	41.42/41.44	41.42/41.44	41.42/41.44
Base elevation (meters)	198.12	198.12	198.12
Stack temperature (K) <sup>f</sup>	883.71	883.71	883.71
Exit velocity (m/s) <sup>f</sup>	50.78	45.17	45.17
Stack height (meters)	34.90	34.90	34.90
Stack diameter (meters)	5.49	5.49	5.49

(a) Maximum 24-hour natural gas emissions, including 3 start-ups per day and 3 shutdowns per day combusting natural gas and the remainder of the time operating with TurboPhase.

(b) Maximum 24-hour fuel oil emissions, including 1 start-up per day and 1 shutdown per day combusting fuel oil.

(c) Maximum annual emissions, annualized based on 8,760 hours per year to obtain lb/hr rates. NO<sub>x</sub> and SO<sub>2</sub> emissions based on maximum ton per year limits. Emissions include start-up and shutdown emissions on gas and oil and 19,081,721,569 standard cubic feet per year (SCF/year) fuel combusted for both turbines combined which includes fuel oil at 889 standard cubic feet (SCF) for every gallon combusted. Also includes maximum permitted hours on TurboPhase

(d) Based on ultra-low sulfur diesel fuel.

(e) Lambert conic conformal NWS-84

(f) K = Kelvin, m/s = meters per second, GT = gas turbine

## 4.2 Particulate Matter Speciation

For the visibility analysis, particulate matter components can have a different coefficient of light extinction efficiency depending on their nature and size. The NPS particulate matter speciation method for natural gas-fired combustion turbines and fuel oil-fired combustion turbines was used for this analysis. The speciation spreadsheet from the NPS website was used as a basis for the speciated emissions and is shown in Appendix C for both natural gas and fuel oil.

Natural gas particulate matter speciation methodology (NPS, no date- b):

- Sulfur emissions - 67 percent of the total SO<sub>2</sub> was speciated into SO<sub>2</sub> and 33 percent of total SO<sub>2</sub> was speciated into sulfate (SO<sub>4</sub>)

- Total particulate matter emissions from natural gas operations were speciated into elemental carbon (EC) and organic carbon (OC), indicated as “SOA” (secondary organic aerosol) in the modeling input file
- Direct emissions of nitric acid (HNO<sub>3</sub>) and nitrate (NO<sub>3</sub>) were assumed to be zero

Fuel oil particulate matter speciation methodology (NPS, no date-c):

- Sulfur emissions – 60 percent of the total SO<sub>2</sub> was speciated into SO<sub>2</sub> and 40 percent of total SO<sub>2</sub> was speciated into SO<sub>4</sub>
- Total particulate matter emissions from fuel oil operations were speciated into EC and OC (SOA), and soil
- Direct emissions of HNO<sub>3</sub> and NO<sub>3</sub> were assumed to be zero

For the modeling process of the turbines, the particulate matter emissions were speciated into six size categories: PM<sub>0.05</sub>, PM<sub>0.01</sub>, PM<sub>0.15</sub>, PM<sub>0.20</sub>, PM<sub>0.25</sub>, and PM<sub>1.0</sub>. The size distribution is shown in Table 4-2. The categories are indicated as PM0005, PM0010, PM0015, PM0020, PM0025, and PM0100 in the modeling, respectively. The particulate emissions were combined into an output group and defined by name as EC in the CALPUFF model. The size-specific particulate matter from the turbines for both fuel oil and natural gas is smaller than particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>) and particulate matter less than 10 microns in diameter (PM<sub>10</sub>); therefore, all particulate matter is modeled as EC. The extinction efficiency is also higher for EC than fine particulate matter (PMF) and coarse particulate matter (PMC). The modeled emission rates for each of the species are shown in Table 4-3.

**Table 4-2: Size Distribution of Elemental Carbon (EC) for Natural Gas- and Oil-Fired Combustion Turbines**

Modeled Species Name	Size Distribution (%)	Median Diameter (microns)	Geometric Standard Deviation (microns)
SO <sub>4</sub>	100	0.48	0.50
NO <sub>3</sub>	100	0.48	0.50
PM0005	15	0.05	0.00
PM0010	40	0.10	0.00
PM0015	63	0.15	0.00
PM0020	78	0.20	0.00
PM0025	89	0.25	0.00
PM0100	100	1.00	0.00

Source: NPS, no date-b; NPS, no date-c

**Table 4-3: Speciated Emissions for CALPUFF Visibility and Deposition Analyses**

Pollutant		Visibility Analysis (Short Term Average)		Deposition Analysis (Annual Average)
		Combustion Turbine (Natural Gas)	Combustion Turbine (Fuel Oil)	Combustion Turbine (Natural Gas/Fuel Oil)
		grams per second		
SO <sub>2</sub>		0.24	0.23	0.14
SO <sub>4</sub>		0.18	0.23	0.14
NO <sub>x</sub>		11.35	60.56	6.68
HNO <sub>3</sub>		-	-	-
NO <sub>3</sub>		-	-	-
PMC (PM <sub>10</sub> )		-	-	-
PMF (PM <sub>2.5</sub> )		-	-	-
EC	PM0005	0.0954	0.1364	-
	PM0010	0.1591	0.2273	-
	PM0015	0.1463	0.2091	-
	PM0020	0.0954	0.1364	-
	PM0025	0.0700	0.1000	-
	PM0100	0.0700	0.1000	-
OC (SOA)		1.73	2.86	-
Soil		-	0.91	-

## 5.0 CLASS I VISIBILITY ANALYSIS

The IWAQM developed a set of procedures for use in evaluating visibility impacts (EPA, 1998) that are referenced in the FLAG Phase I Report – Revised (2010) (FLAG 2010) on assessing AQRV in Class I areas (USFS, NPS, and USFWS, 2010). The methodologies listed in FLAG 2010 and FLM’s CALPUFF Reviewer’s Guide were used for the visibility analysis.

### 5.1 Visibility Model Inputs

The FLAG 2010 visibility analysis recommendations specify that “Method 8” should be employed; therefore “Method 8” was used for this analysis and MVISBK was set to 8. FLAG 2010 recommendations for visibility parameters were also used for this analysis (MVISCHECK was set to 1). The maximum relative humidity (RHMAX) was set to 95 percent, per FLM’s recommendation. Default extinction efficiencies for all modeled species (OC, soil, EC, PMC, PMF, ammonium sulfate  $(\text{NH}_4)_2\text{SO}_4$ , ammonium nitrate  $\text{NH}_4\text{NO}_3$ ) were used.

Background extinction coefficients are computed from monthly concentrations of  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{NO}_3$ , OC, soil, and EC and are provided in the FLAG 2010 document. The annual average natural conditions which include background concentrations and Rayleigh scattering that was used for this analysis for each Class I area are shown in Table 5-1.

**Table 5-1: Annual Average Natural Conditions – Concentrations and Rayleigh Scattering by Class I Area (for CALPOST Method 8 Application)**

Class I Area	$(\text{NH}_4)_2\text{SO}_4^a$	$\text{NH}_4\text{NO}_3^a$	OM <sup>a</sup>	EC <sup>a</sup>	Soil	CM <sup>a</sup>	Sea Salt	Rayleigh	Type
	$\mu\text{g}/\text{m}^3$ <sup>a</sup>							$\text{Mm}^{-1}$ <sup>a</sup>	
Dolly Sods Wilderness	0.23	0.10	1.80	0.02	0.43	2.19	0.02	10	Annual
Otter Creek Wilderness	0.23	0.10	1.80	0.02	0.43	2.19	0.02	10	Annual
James River Face Wilderness	0.23	0.10	1.80	0.02	0.48	3.00	0.02	11	Annual
Shenandoah National Park	0.23	0.10	1.80	0.02	0.41	2.88	0.02	10	Annual

Source: USFS, NPS, and USFWS, 2010

(a)  $(\text{NH}_4)_2\text{SO}_4$  = ammonium sulfate,  $\text{NH}_4\text{NO}_3$  = ammonium nitrate, OM = organic mass, EC = elemental carbon, CM = coarse mass,  $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter;  $\text{Mm}^{-1}$  = inverse megameters

Extinction coefficients for hygroscopic species can be computed using different values. For this analysis, the M8\_MODE parameter of 5 was used to conform to the FLAG 2010 recommendations, which utilizes monthly RHFSML, RHFLRG, and RHFSEA with daily modeled and monthly background concentrations. For this Class I visibility analysis, monthly average relative humidity factor values

developed by EPA for large hygroscopic particles, small hygroscopic particles, and sea salt were used and are specified in Table 5-2 for each Class I area.

**Table 5-2: Monthly Relative Humidity Adjustment Factors for Each Class I Area**

Parameter <sup>a</sup>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Dolly Sods Wilderness</b>												
$f_L(\text{RH})$	2.53	2.39	2.38	2.20	2.63	2.65	2.74	2.90	2.94	2.65	2.45	2.61
$f_S(\text{RH})$	3.39	3.16	3.17	2.87	3.63	3.62	3.78	4.06	4.15	3.63	3.27	3.53
$f_{SS}(\text{RH})$	3.60	3.35	3.31	3.03	3.66	3.76	3.91	4.12	4.16	3.72	3.47	3.72
<b>Otter Creek Wilderness</b>												
$f_L(\text{RH})$	2.55	2.41	2.40	2.23	2.64	2.69	2.80	2.96	3.00	2.69	2.48	2.63
$f_S(\text{RH})$	3.41	3.20	3.20	2.91	3.64	3.70	3.88	4.18	4.26	3.72	3.32	3.56
$f_{SS}(\text{RH})$	3.63	3.40	3.34	3.06	3.67	3.82	3.98	4.19	4.23	3.78	3.51	3.76
<b>James River Face Wilderness</b>												
$f_L(\text{RH})$	2.44	2.30	2.29	2.12	2.47	2.58	2.65	2.78	2.82	2.57	2.36	2.51
$f_S(\text{RH})$	3.25	3.03	3.02	2.72	3.31	3.48	3.59	3.83	3.91	3.48	3.11	3.38
$f_{SS}(\text{RH})$	3.43	3.19	3.16	2.90	3.46	3.69	3.79	3.97	4.00	3.61	3.31	3.56
<b>Shenandoah National Park</b>												
$f_L(\text{RH})$	2.44	2.28	2.29	2.12	2.45	2.56	2.65	2.79	2.81	2.53	2.34	2.55
$f_S(\text{RH})$	3.26	2.99	3.02	2.72	3.28	3.46	3.59	3.85	3.91	3.41	3.08	3.44
$f_{SS}(\text{RH})$	3.44	3.17	3.17	2.90	3.42	3.66	3.78	3.97	3.98	3.56	3.28	3.62

Source: USFS, NPS, and USFWS, 2010

(a)  $f_L(\text{RH})$  = relative humidity adjustment factor for large sulfate and nitrate;  $f_S(\text{RH})$  = relative humidity adjustment factor for small sulfate and nitrate;  $f_{SS}(\text{RH})$  = relative humidity adjustment factor for sea salt

## 5.2 Visibility Impairment Determinations

The purpose of the visibility analysis is to calculate the change in light extinction when comparing the background visibility to the predicted value at each receptor for each day (24-hour period) of the year due to the Project sources.

Processing of visibility impairment was carried out using the CALPUFF post-processor CALPOST using Method 8. The 98th percentile in light extinction, which is the 8th highest daily value for each year, was calculated and was compared to the level of acceptable change of 5.0 percent. As shown in Table 5-3, the visibility impact is less than 5.0 percent for year for each Class I area for both natural gas and fuel oil operation. The Project is not expected to have any noticeable effect on visibility since the predicted visibility impacts are well below the level of acceptable change and no further analysis will be conducted.

Model input and output files for the visibility analysis will be provided on an external hard drive to the modeling individuals at the U.S. Forest Service (USFS), NPS, and WVDEP.

**Table 5-3: Visibility Analysis Results**

Class I Area	Year	Maximum 98th Percentile Change in Light Extinction			
		Maximum 24-hour Natural Gas Turbine Operation		Maximum 24-hour Fuel Oil Turbine Operation	
		Percent Change	Julian CALPOST – printed day	Percent Change	Julian CALPOST – printed day
Otter Creek Wilderness	2001	0.88	12	3.25	24
	2002	0.81	235	2.91	235
	2003	0.89	144	3.39	271
Dolly Sods Wilderness	2001	0.69	117	2.66	117
	2002	0.56	260	2.16	296
	2003	0.52	266	2.09	266
James River Face Wilderness	2001	0.28	48	1.19	317
	2002	0.32	20	1.22	2
	2003	0.24	286	0.95	291
Shenandoah National Park	2001	0.64	99	2.59	8
	2002	0.66	296	2.40	300
	2003	0.75	16	2.93	273

## 6.0 NITROGEN AND SULFUR DEPOSITION ANALYSIS

A deposition analysis was performed to evaluate deposition-induced changes from nitrogen (N) and sulfur (S). The FLMs developed a “Deposition Analysis Threshold” (DAT) value and guidance to evaluate the impact of additional N or S deposition on lands under their management. A DAT is “the additional amount of nitrogen or sulfur deposition within a FLM area, below which estimated impacts from a proposed new or modified source are considered negligible” (NPS, 2011). The modeled N and S deposition rates were compared to the DAT for eastern states, which is 0.010 kilograms per hectare per year (kg/ha/yr) for N and S (NPS, 2011).

The impacts are considered negligible if the Project deposition impacts are below the DATs. If the deposition analysis does not result in any impacts above the DAT, no further analysis is conducted. If the impacts are equal to or greater than the DAT, then the FLMs are consulted to determine the need for a refined analysis.

### 6.1 Nitrogen and Sulfur Deposition

N deposition is due to  $\text{HNO}_3$ ,  $\text{NO}_3$ ,  $\text{NO}_x$ , and  $\text{SO}_4$  (with wet and dry deposition for each  $[\text{NH}_4]_2\text{SO}_4$  and  $\text{NH}_4\text{NO}_3$ ). S deposition is also due to wet and dry deposition from  $\text{SO}_2$  and  $\text{SO}_4$ . Default data for deposition parameters were used in the CALPUFF file.

Total deposition is weighted as the summation of wet and dry deposition from both N and S. The N and S deposition are calculations performed by the POSTUTIL and CALPOST programs. The recommended POSTUTIL scaling factors for the deposition calculations were used and were calculated as follows (Anderson, 2011):

$$\begin{aligned}\text{Total N Deposition} &= 0.29167 * (\text{total } \text{SO}_4 \text{ deposition}) + 0.22222 * (\text{total } \text{HNO}_3 \text{ deposition}) + \\ &\quad 0.45161 * (\text{total } \text{NO}_3 \text{ deposition}) + 0.30435 * (\text{total } \text{NO}_x \text{ deposition}) \\ \text{Total S Deposition} &= 0.5 * (\text{total } \text{SO}_2 \text{ deposition}) + 0.333 * (\text{total } \text{SO}_4)\end{aligned}$$

A conversion factor of 315.36 was applied to the CALPOST file to convert the output units of micrograms per square meter per second ( $\mu\text{g}/\text{m}^2/\text{s}$ ) to kg/ha/yr. Therefore, the  $\mu\text{g}/\text{m}^2/\text{s}$  result in the output file is in kg/ha/yr.

## 6.2 Deposition Results

The N and S deposition modeling results for each Class I area compared to the DAT are shown in Table 6-1. The N and S deposition rates are well below the applicable DAT. Given deposition rates from the Project, the Project is not expected to have adverse impacts resulting from deposition and no further analysis will be conducted.

Model input and output files for the deposition analysis have been provided on an external hard drive to the modeling individuals at the USFS, NPS, and WVDEP.

**Table 6-1: Deposition Analysis Results**

Class I Area	Year	Project Nitrogen Deposition Rate	Deposition Analysis Threshold for Nitrogen	Project Sulfur Deposition Rate	Deposition Analysis Threshold for Sulfur
		kilograms per hectare per year (kg/ha/yr)			
Otter Creek Wilderness	2001	0.0014	0.010	0.00011	0.010
	2002	0.0013	0.010	0.00011	0.010
	2003	0.0014	0.010	0.00011	0.010
Dolly Sods Wilderness	2001	0.0012	0.010	0.00009	0.010
	2002	0.0011	0.010	0.00009	0.010
	2003	0.0012	0.010	0.00010	0.010
James River Face Wilderness	2001	0.00042	0.010	0.000032	0.010
	2002	0.00041	0.010	0.000032	0.010
	2003	0.00033	0.010	0.000025	0.010
Shenandoah National Park	2001	0.00056	0.010	0.000043	0.010
	2002	0.00052	0.010	0.000042	0.010
	2003	0.00068	0.010	0.000054	0.010

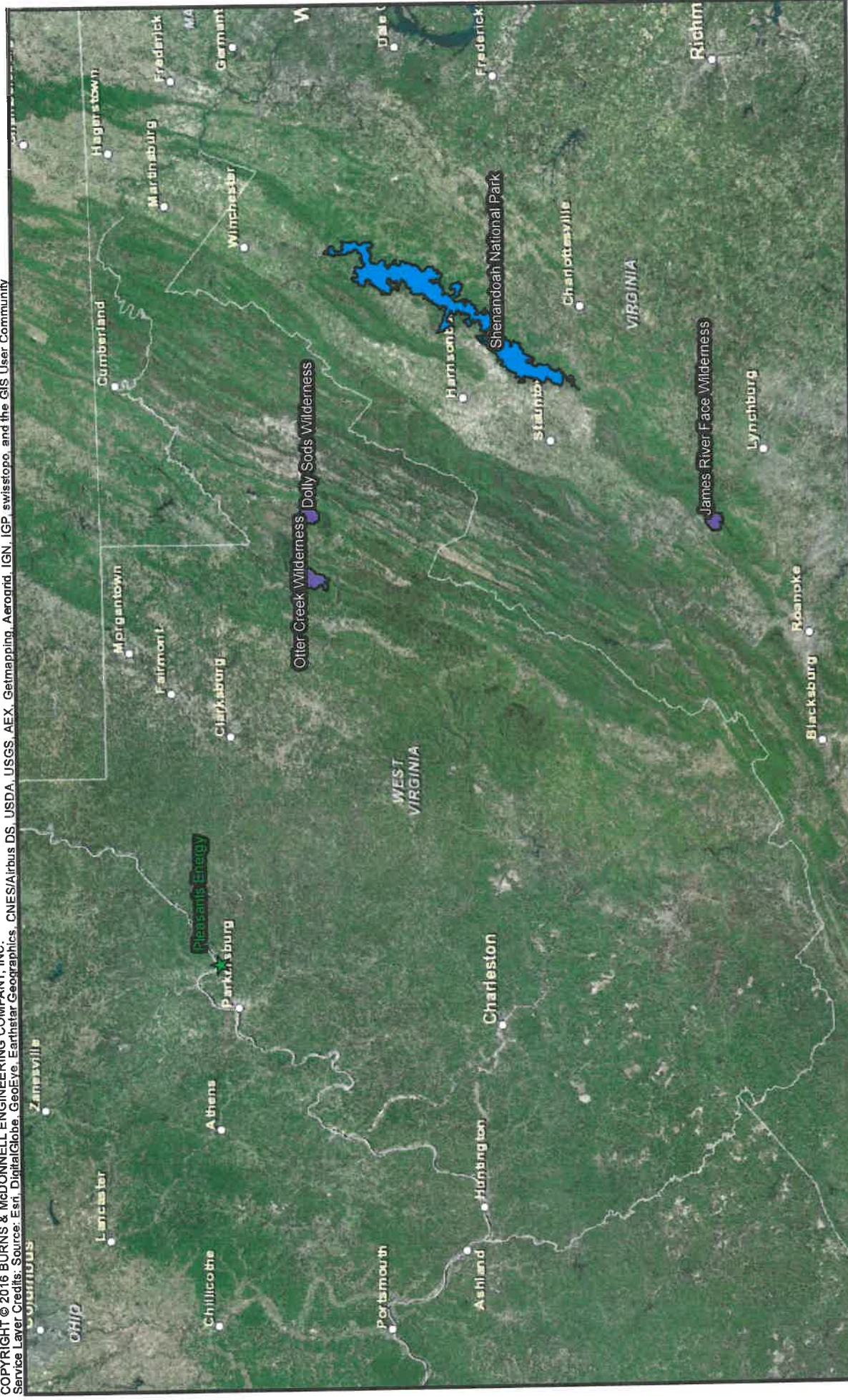
Source: NPS, 2011



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## **APPENDIX A – FIGURES**



★ Pleasants Energy (Project Location)

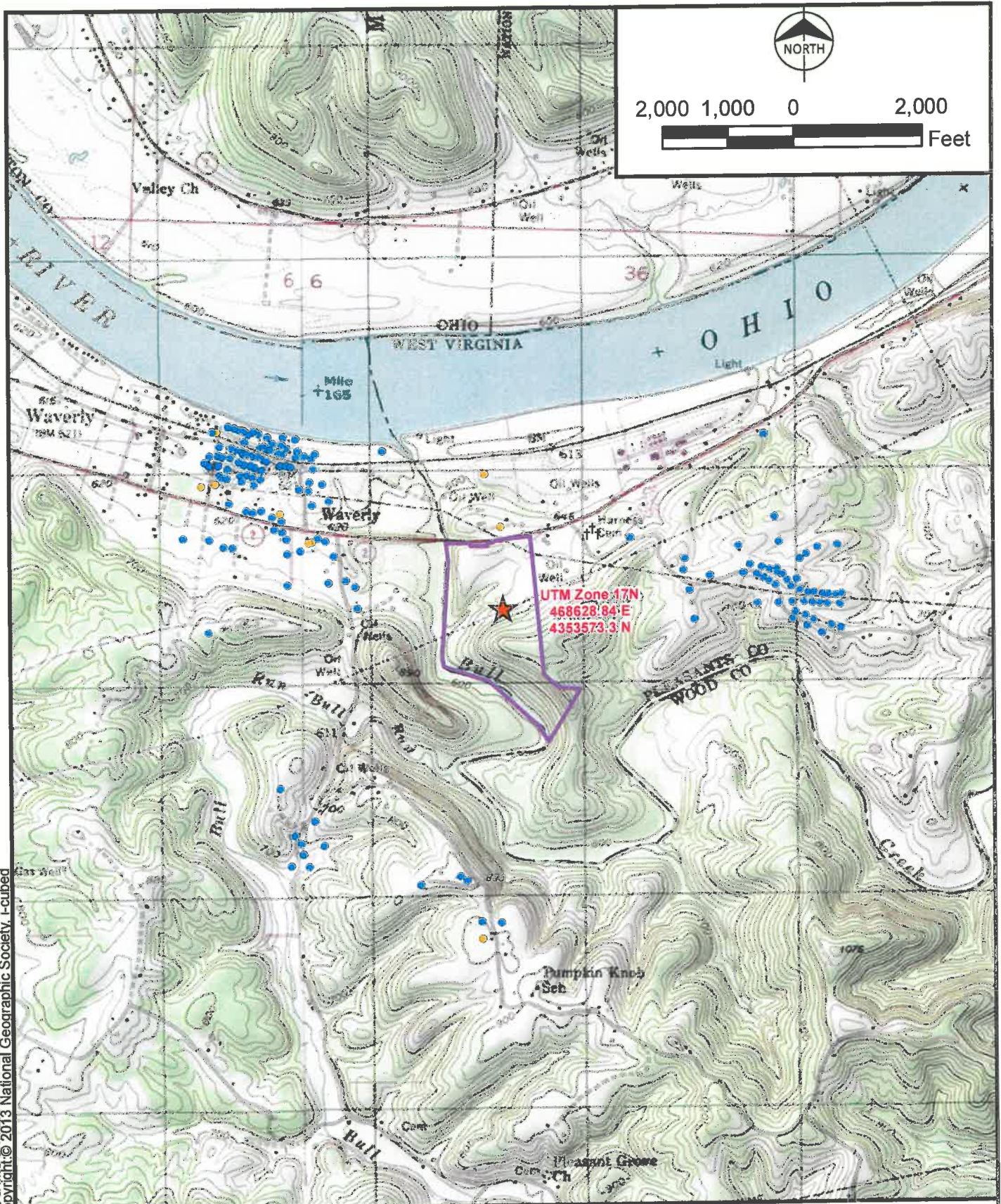
■ U.S. Forest Service Class I

■ National Park Service Class I



Figure A-1  
Project Location & Class I Areas  
Pleasants Energy, LLC





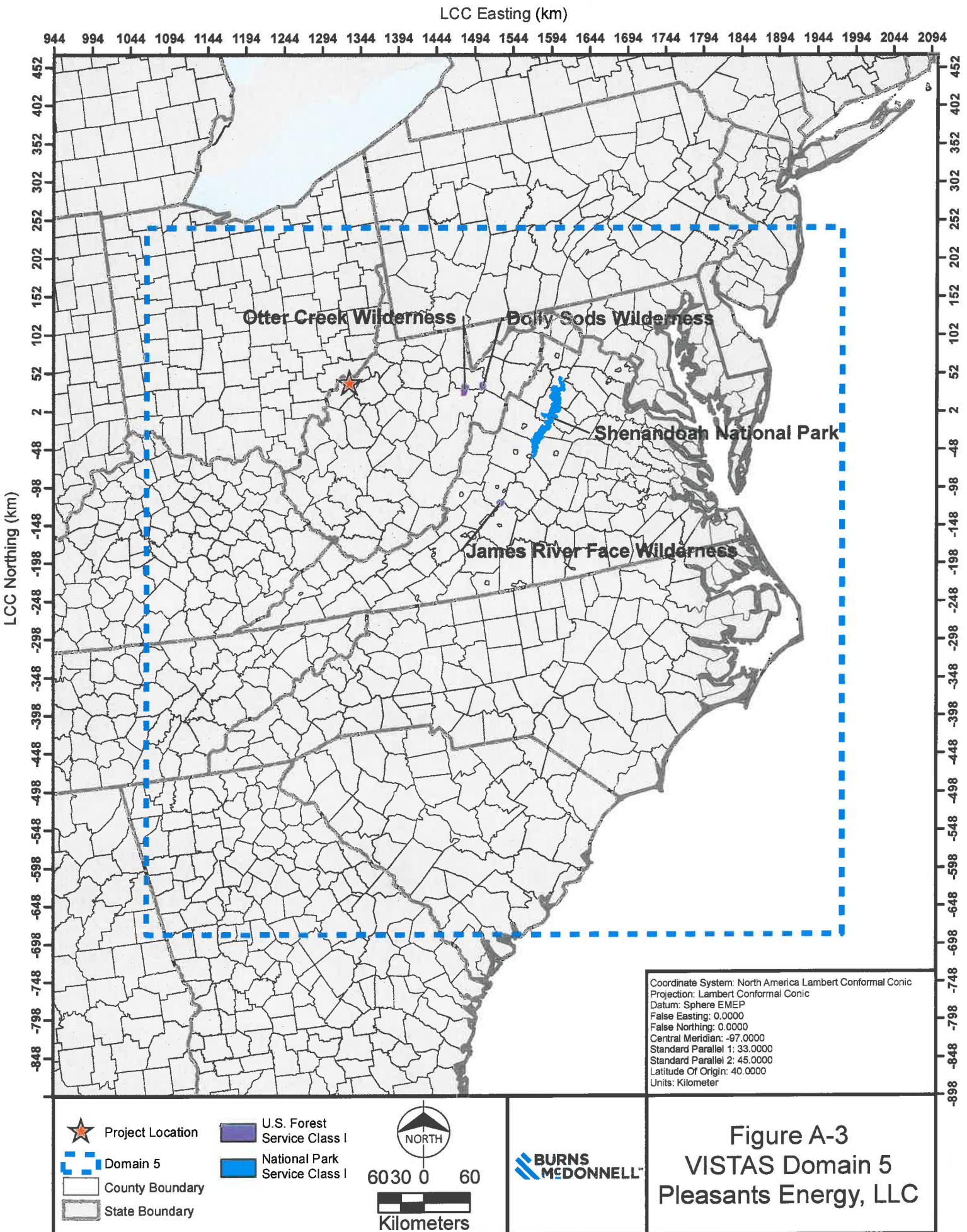
## Legend

- Business
- House
- †† Cemetery
- ★ Project Location
- Property Boundary



Figure A-2  
 Area Map  
 Pleasants Energy, LLC





**Figure A-3**  
**VISTAS Domain 5**  
**Pleasants Energy, LLC**

## **APPENDIX B – MODELING PROTOCOL**

# Prevention of Significant Deterioration Class I Visibility and Deposition Modeling Protocol

**Pleasants Energy, LLC**

**Pleasants Energy Facility  
Project No. 84344**

**January 2016**

# **Prevention of Significant Deterioration Class I Visibility and Deposition Modeling Protocol**

prepared for

**Pleasants Energy, LLC  
Pleasants Energy Facility  
Waverly, West Virginia**

**Project No. 84344**

**January 2016**

prepared by

**Burns & McDonnell Engineering Company, Inc.  
Kansas City, Missouri**

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**LIST OF ABBREVIATIONS**

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
$\mu\text{g}/\text{m}^2/\text{s}$	micrograms per square meter per second
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AIRS	Aerometric Information Retrieval System
AQRV	Air Quality Related Value
CASTNet	Clean Air Status and Trends Network
CFR	Code of Federal Regulations
CM	coarse mass
DAT	Deposition Analysis Threshold
EC	elemental carbon
EPA	U.S. Environmental Protection Agency
$f_L(\text{RH})$	relative humidity adjustment factor for large sulfate and nitrate
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
$f_s(\text{RH})$	relative humidity adjustment factor for small sulfate and nitrate
$f_{ss}(\text{RH})$	relative humidity adjustment factor for sea salt
GT	gas turbine
$\text{HNO}_3$	nitric acid
IWAQM	Interagency Workgroup on Air Quality Modeling
K	Kelvin
$\text{kg}/\text{ha}/\text{yr}$	kilogram per hectare per year
lb/hr	pounds per hour

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
LCC	Lambert conic conformal
m/s	meters per second
Mm <sup>-1</sup>	inverse megameters
MM5	Fifth-Generation Penn State/NCAR Mesoscale Model
MP	McElroy-Pooler
MW	megawatt
N	nitrogen
NCAR	National Center for Atmospheric Research
NH <sub>4</sub> NO <sub>3</sub>	ammonium nitrate
(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	ammonium sulfate
NO <sub>3</sub>	nitrate
NO <sub>x</sub>	nitrogen oxides
NPS	National Park Service
OC	organic carbon
OM	organic mass
PG	Pasquill-Gifford
Pleasants Energy	Pleasants Energy, LLC
PM <sub>10</sub>	particulate matter less than 10 microns in diameter
PM <sub>2.5</sub>	particulate matter less than 2.5 microns in diameter
PMC	coarse particulate matter
PMF	fine particulate matter
ppm	parts per million

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
PSD	Prevention of Significant Deterioration
RHMAX	maximum relative humidity
S	sulfur
SCF	standard cubic feet
SCF/yr	standard cubic feet per year
SO <sub>2</sub>	sulfur dioxide
SO <sub>4</sub>	sulfate
SOA	secondary organic aerosol
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
WVDEP	West Virginia Department of Environmental Protection

## 1.0 INTRODUCTION

Pleasants Energy, LLC (Pleasants Energy), located near Waverly within Pleasants County, West Virginia, installed two simple-cycle General Electric 7FA combustion turbines at the Pleasants Energy facility in 2001, under permit number R13-2373, with an administrative amendment in 2006 (R13-2373A). The permit had operational restrictions to limit the facility's potential to emit to less than 250 tons per year of any criteria pollutant so the facility could be minor for Prevention of Significant Deterioration (PSD). Pleasants Energy submitted an air construction permit application to increase the hours of operation of the combustion turbines (hereafter referred to as Project). Since the Project will lift the synthetic minor limitation on the combustion turbines and will increase emissions to greater than 250 tons per year, this Project is subject to PSD.

Recent Federal Land Manager (FLM) guidance recommends that a proposed major source, in the course of a PSD application, perform an assessment of air quality impacts at Class I areas if these areas are located within 300 kilometers of the proposed facility. There are four Class I areas that are within 300 kilometers of the Project:

- Otter Creek Wilderness (130 kilometers)
- Dolly Sods Wilderness (160 kilometers)
- Shenandoah National Park (200 kilometers)
- James River Face Wilderness (253 kilometers)

The use of the Screening Procedure (Q/D) to determine if the Project could opt (screen) out of an Air Quality Related Value (AQRV) assessment for visibility and deposition with CALPUFF was initially performed. Although overall turbine emissions are limited on a tons per year basis for nitrogen oxides ( $\text{NO}_x$ ) and sulfur dioxide ( $\text{SO}_2$ ) and on a fuel usage limit, per guidance from the FLMs, the maximum 24-hour emission rate must be used and ratioed for 365-day operation to determine the "Q" value when assessing the need for a full visibility analysis. When using the maximum 24-hour rate for fuel oil, the Q/D for the Project is greater than 10 for all Class I areas within 300 kilometers; therefore, an AQRV analysis is required.

Therefore, a visibility and deposition analysis will be performed for each of the four Class I areas that are within a 300-kilometer radius of the Project site. The locations of the Project and the four Class I areas listed above are shown in Figure A-1 in Appendix A.

This protocol presents Class I visibility and deposition modeling parameters to be used in developing the AQRV analysis for the Project. Submittal of this protocol will allow the West Virginia Department of Environmental Protection (WVDEP) and FLMs to review and comment upon the methodology to be employed in the Class I visibility and deposition modeling analysis.

Included in this document is a brief description of the Project, proposed model to be used, modeling methodologies, and model input parameters. Draft CALPUFF, CALPOST, and POSTUTIL input files will be submitted with this protocol for review and comment. This Class I visibility and deposition modeling protocol and input files have been drafted in accordance with guidance from the U.S. Environmental Protection Agency (EPA), FLMs, and WVDEP modeling guidelines.

## 2.0 PROJECT DESCRIPTION

Pleasants Energy plans to increase the hours of operation of its two simple-cycle General Electric 7FA combustion turbines at the Pleasants Energy facility located near Waverly, West Virginia. The facility currently operates under Title V permit number R30-07300022-2014. The facility is located in Pleasants County, which is currently designated as an attainment/unclassified area for all criteria pollutants in 40 Code of Federal Regulations (CFR) Part 81. The location of the Pleasants Energy site is shown in Figure A-2 in Appendix A.

The combustion turbines operate in simple-cycle mode only to generate electricity. The combustion turbines will be permitted with restricted operation. The turbines will have a combined  $\text{NO}_x$  limit of 464.6 tons per year, with compliance shown via continuous emission monitors. Additionally, the combustion turbines will be limited to 16.5 tons per year of  $\text{SO}_2$  emissions on an annual basis based on 15 parts per million (ppm) sulfur diesel fuel. For all other pollutants, the turbines will have an overall fuel usage limit for both combustion turbines combined of 19,081,721,569 standard cubic feet per year (SCF/year), which includes both fuel oil and natural gas. When fuel oil is combusted, it will be equal to 889 standard cubic feet (SCF) for every gallon combusted. This fuel limit methodology is consistent with Pleasants Energy's current minor source permit limitation.

Each of the combustion turbines is currently permitted to operate with TurboPhase. The TurboPhase systems increase the output of each of the existing combustion turbines up to approximately 18 megawatts (MW) by injecting externally supplied air into the combustion turbine after compressor discharge at the inlet to the combustor. This increases mass flow through the turbines and generator output. Therefore, maximum emissions occur when TurboPhase is operating on the combustion turbines.

The Project emission units, emission unit sizes, number of units, and fuels combusted are displayed in Table 2-1.



**Table 2-1: Project Emission Units and Approximate Operation Estimates**

Emissions Unit	Size <sup>a,b</sup>	Number of Units	Fuel	Estimated Operation
Combustion turbine	191.2 MW (natural gas) 196.9 MW (fuel oil)	2	Natural gas	19,081,721,569 SCF/year both turbines combined <sup>a,c</sup>
			Fuel oil	
			Natural gas	365 start-ups and shutdowns (each) <sup>d</sup>
			Fuel oil	20 start-ups and shutdowns (each) <sup>d</sup>

(a) MW = megawatt, SCF/year = standard cubic feet per year

(b) Output is increased by 18 MW when TurboPhase is operating.

(c) The standard cubic feet (SCF) limit includes both fuel oil and natural gas where fuel oil usage equals 889 SCF for every gallon combusted.

(d) One start-up is limited to 2 hours, and one shutdown is limited to 1 hour each.

### 3.0 PROPOSED MODEL

CALPUFF and its meteorological model CALMET, are designed to handle complex terrain, the long source-to-receptor distances, chemical transformation and deposition, and other issues related to Class I impacts. The CALPUFF modeling system has been adopted by the EPA as a guideline model for long-range transport (source to receptor distances of 50 kilometers or more), and for use on a case-by-case basis in complex flow for shorter distances. CALPUFF is recommended for Class I impact assessments by the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) and the Interagency Workgroup on Air Quality Modeling (IWAQM).

Pleasants Energy is proposing to use the following EPA-approved versions of the CALPUFF modeling system for the visibility and deposition modeling (Exponent, no date):

- CALMET Version 5.8.4, Level 130731
- CALPUFF Version 5.8.4, Level 130731
- POSTUTIL Version 1.56, Level 070627
- CALPOST Version 6.221, Level 080724

#### 3.1 Modeling Domain

The Visibility Improvement State and Tribal Association of the Southeast (VISTAS) is the regional consortium of Federal, state, local, and tribal organizations formed to “address regional haze and visibility problems in the southeastern United States.” The VISTAS Domain 5 data will be used for the modeling domain.

The specifications for VISTAS Domain 5 are shown in Table 3-1.

**Table 3-1: Class I Modeling Domain Specifications**

Domain	Southwest Coordinates	Number of X Grid Cells	Number of Y Grid Cells	Horizontal Grid Spacing (kilometers)
VISTAS Domain 5	NWS-84 X coordinate = 1,066.005 kilometers Y coordinate = -686.004 kilometers	228	232	4

The VISTAS Domain 5 is 912 by 928 kilometers. Ten vertical levels were used. The cell face heights are located at 0, 20, 40, 80, 160, 320, 640, 1,200, 2,000, 3,000, and 4,000 meters.

The Lambert conformal conic (LCC) projection system will be used for the CALMET/CALPUFF modeling domain to account for the Earth's curvature. The LCC grid projection will match the Fifth-Generation Penn State/National Center for Atmospheric Research (NCAR) Mesoscale Model (MM5) data.

### 3.2 Receptors

The National Park Service (NPS) database of modeling receptors for Class I areas was downloaded from the NPS website (NPS, no date-a) and will be used for this analysis for each of the Class I areas being modeled. The receptor data will use the LCC projection system.

### 3.3 CALMET

CALMET is a diagnostic meteorological model that produces three-dimensional wind and temperature fields and two-dimensional fields of mixing heights and other meteorological fields. It contains slope flow effects, terrain channeling, and kinematic effects of terrain.

One of the products of VISTAS was the development of a standardized CALMET gridded wind field for use in long-range transport of pollutants. Therefore, processed and approved CALMET VISTAS Domain 5 will be used for this analysis. The processed data includes 3 years of hourly output data (2001, 2002, and 2003) in the LCC projection coordinate system. A summary of major characteristics of the CALMET model is outlined in the CALMET User's Guide (Scire, 2000b).

### 3.4 CALPUFF

CALPUFF is a non-steady state model that includes algorithms for building downwash effects as well as chemical transformation, wet deposition, and dry deposition. CALPUFF can combine effects of terrain, dry and wet deposition, and overwater dispersion to predict pollutants' impacts.

The CALPUFF simulations will be conducted for the years 2001 to 2003 using the following model options:

- Gaussian distribution
- Partial plume path adjustment for terrain
- Transitional plume rise
- Stack tip downwash
- Wet deposition, dry deposition, and chemical transformation using the MESOPUFF II scheme
- Pasquill-Gifford (PG) dispersion coefficients (rural areas), McElroy-Pooler (MP) dispersion coefficients (urban areas)

Deposition and transformation effects will be modeled using the default dry deposition model, the scavenging coefficient wet removal module, and the default MESOPUFF II chemical transformation mechanism. The major features and options of the CALPUFF model are outlined in the CALPUFF User's Guide (Scire, 2000a).

The FLM's CALPUFF Reviewer's Guide will be followed as a guide for this analysis (Anderson, 2011).

### **3.4.1 Ozone Background Data**

Hourly measured ozone concentrations provided in an external "ozone.dat" file were based on VISTAS datasets and will be used for the analysis. Data from the EPA Aerometric Information Retrieval System (AIRS) and Clean Air Status and Trends Network (CASTNet) were used to develop the hourly ozone data file.

### **3.4.2 Ammonia Background Data**

A constant ammonia concentration of 10 parts per billion will be assumed for all CALPUFF modeling runs. This concentration will be specified in the CALPUFF input file. No ammonia background will be applied in POSTUTIL (NH3TPY = 0).

## **4.0 SITE-SPECIFIC MODELING DATA**

The Project-specific source emissions, stack parameters, and particulate matter speciation used in the modeling analysis are explained in detail in this chapter.

### **4.1 Source Emissions and Stack Parameters**

Two operating scenarios will be modeled for the visibility analysis: maximum 24-hour fuel oil operations and maximum 24-hour natural gas operations. For deposition modeling, the maximum annual emission rates, based on ton per year, and fuel limitations will be modeled. The detailed emissions calculations that demonstrate how the emission rates were obtained are shown in Appendix B.

The fuel oil short-term rates will be modeled with 100 percent load fuel oil operation stack parameters, and the natural gas short-term rates will be modeled with 100 percent load with TurboPhase natural gas operation stack parameters, since these are the predominant maximum emission rates for a 24-hour period. For deposition modeling, the maximum annual emission rates will be modeled with 100 percent load fuel oil operation stack parameters since these parameters are worst-case. All emissions and stack parameters are shown in Table 4-1.

**Table 4-1: Combustion Turbine Emissions and Modeling Parameters – per Turbine**

Pollutant	Natural Gas 24-hour Maximum Emission Rate for Visibility Modeling	Fuel Oil 24-hour Maximum Emission Rate for Visibility Modeling	Natural Gas/Fuel Oil Annual Maximum Emission Rate for Deposition Modeling
	pounds per hour (lb/hr)		
NO <sub>x</sub>	90.08 <sup>a</sup>	480.68 <sup>b</sup>	53.04 <sup>c</sup>
SO <sub>2</sub> <sup>d</sup>	2.80	3.09	1.88 <sup>c</sup>
PM <sub>10</sub> /PM <sub>2.5</sub>	20.20	39.00	-
<b>Stack Parameters</b>			
X GT1/GT2 (kilometers) <sup>e, f</sup>	1,334.16/1,334.21	1,334.16/1,334.21	1,334.16/1,334.21
Y GT1/GT2 (kilometers) <sup>e, f</sup>	41.42/41.44	41.42/41.44	41.42/41.44
Base elevation (meters)	198.12	198.12	198.12
Stack temperature (K) <sup>f</sup>	883.71	883.71	883.71
Exit velocity (m/s) <sup>f</sup>	50.78	45.17	45.17
Stack height (meters)	34.90	34.90	34.90
Stack diameter (meters)	5.49	5.49	5.49

(a) Maximum 24-hour natural gas emissions, including 3 start-ups per day and 3 shutdowns per day combusting natural gas and the remainder of the time operating with TurboPhase.

(b) Maximum 24-hour fuel oil emissions, including 1 start-up per day and 1 shutdown per day combusting fuel oil.

(c) Maximum annual emissions, annualized based on 8,760 hours per year to obtain lb/hr rates. NO<sub>x</sub> and SO<sub>2</sub> emissions based on maximum ton per year limits. Emissions include start-up and shutdown emissions on gas and oil and 19,081,721,569 standard cubic feet per year (SCF/year) fuel combusted for both turbines combined which includes fuel oil at 889 standard cubic feet (SCF) for every gallon combusted. Also includes maximum permitted hours on TurboPhase

(d) Based on 15 parts per million (ppm) sulfur diesel fuel.

(e) Lambert conic conformal NWS-84

(f) K = Kelvin, m/s = meters per second, GT = gas turbine

## 4.2 Particulate Matter Speciation

For the visibility analysis, particulate matter components can have a different coefficient of light extinction efficiency depending on their nature and size. The NPS particulate matter speciation method for natural gas-fired combustion turbines and fuel oil-fired combustion turbines will be used for this analysis. The speciation spreadsheet from the NPS website was used as a basis for the speciated emissions and is shown in Appendix B for both natural gas and fuel oil.

Natural gas particulate matter speciation methodology (NPS, no date- b):

- Sulfur emissions - 67 percent of the total SO<sub>2</sub> will be speciated into SO<sub>2</sub> and 33 percent of total SO<sub>2</sub> will be speciated into sulfate (SO<sub>4</sub>)

- Total particulate matter emissions from natural gas operations will be speciated into elemental carbon (EC) and organic carbon (OC), indicated as “SOA” (secondary organic aerosol) in the modeling input file
- Direct emissions of nitric acid ( $\text{HNO}_3$ ) and nitrate ( $\text{NO}_3$ ) will be assumed to be zero

Fuel oil particulate matter speciation methodology (NPS, no date-c):

- Sulfur emissions – 60 percent of the total  $\text{SO}_2$  will be speciated into  $\text{SO}_2$  and 40 percent of total  $\text{SO}_2$  will be speciated into  $\text{SO}_4$
- Total particulate matter emissions from fuel oil operations will be speciated into EC and OC (SOA), and soil
- Direct emissions of  $\text{HNO}_3$  and  $\text{NO}_3$  will be assumed to be zero

For the modeling process of the turbines, the particulate matter emissions will be speciated into six size categories:  $\text{PM}_{0.05}$ ,  $\text{PM}_{0.01}$ ,  $\text{PM}_{0.15}$ ,  $\text{PM}_{0.20}$ ,  $\text{PM}_{0.25}$ , and  $\text{PM}_{1.0}$ . The size distribution is shown in Table 4-2. The categories will be indicated as PM0005, PM0010, PM0015, PM0020, PM0025, and PM0100 in the modeling, respectively. The particulate emissions will be combined into an output group and defined by name as EC in the CALPUFF model. The size-specific particulate matter from the turbines for both fuel oil and natural gas is smaller than particulate matter less than 2.5 microns in diameter ( $\text{PM}_{2.5}$ ) and particulate matter less than 10 microns in diameter ( $\text{PM}_{10}$ ); therefore, the particulate matter will all be modeled as EC. The extinction efficiency is also higher for EC than fine particulate matter (PMF) and coarse particulate matter (PMC). The modeled emission rates for each of the species are shown in Table 4-3.

**Table 4-2: Size Distribution of Elemental Carbon (EC) for Natural Gas- and Oil-Fired Combustion Turbines**

Modeled Species Name	Size Distribution (%)	Median Diameter (microns)	Geometric Standard Deviation (microns)
SO <sub>4</sub>	100	0.48	0.50
NO <sub>3</sub>	100	0.48	0.50
PM0005	15	0.05	0.00
PM0010	40	0.10	0.00
PM0015	63	0.15	0.00
PM0020	78	0.20	0.00
PM0025	89	0.25	0.00
PM0100	100	1.00	0.00

Source: NPS, no date-b; NPS, no date-c

**Table 4-3: Speciated Emissions for CALPUFF Visibility and Deposition Analyses**

Pollutant	Visibility Analysis (Short Term Average)		Deposition Analysis (Annual Average)
	Turbine (Natural Gas)	Turbine (Fuel Oil)	Turbine (Natural Gas/Fuel Oil)
	grams per second		
SO <sub>2</sub>	0.24	0.23	0.14
SO <sub>4</sub>	0.18	0.23	0.14
NO <sub>x</sub>	11.35	60.56	6.68
HNO <sub>3</sub>	-	-	-
NO <sub>3</sub>	-	-	-
PMC (PM <sub>10</sub> )	-	-	-
PMF (PM <sub>2.5</sub> )	-	-	-
EC	PM0005	0.0954	0.1364
	PM0010	0.1591	0.2273
	PM0015	0.1463	0.2091
	PM0020	0.0954	0.1364
	PM0025	0.0700	0.1000
	PM0100	0.0700	0.1000
OC (SOA)	1.73	2.86	-
Soil	-	0.91	-



## 5.0 CLASS I VISIBILITY ANALYSIS

The IWAQM developed a set of procedures for use in evaluating visibility impacts (EPA, 1998) that are referenced in the FLAG Phase I Report – Revised (2010) (FLAG 2010) on assessing AQRV in Class I areas (USFS, NPS, and USFWS, 2010). The methodologies listed in FLAG 2010 and FLM’s CALPUFF Reviewer’s Guide will be used for the visibility analysis.

The FLAG 2010 visibility analysis recommendations specify that “Method 8” should be employed; therefore “Method 8” will be used for this analysis and MVISBK will be set to 8. FLAG 2010 recommendations for visibility parameters will be used for this analysis (MVISCHECK will be set to 1). The maximum relative humidity (RHMAX) will be set to 95 percent, per FLM’s recommendation. Default extinction efficiencies for all modeled species (OC, soil, EC, PMC, PMF, ammonium sulfate  $[(\text{NH}_4)_2\text{SO}_4]$ , ammonium nitrate  $(\text{NH}_4\text{NO}_3)$ ) will be used.

Background extinction coefficients are computed from monthly concentrations of  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{NO}_3$ , OC, soil, and EC and are provided in the FLAG 2010 document. The annual average natural conditions which include background concentrations and Rayleigh scattering that will be used for this analysis for each Class I area are shown in Table 5-1.

**Table 5-1: Annual Average Natural Conditions – Concentrations and Rayleigh Scattering by Class I Area (for CALPOST Method 8 Application)**

Class I Area	$(\text{NH}_4)_2\text{SO}_4^a$	$\text{NH}_4\text{NO}_3^a$	$\text{OM}^a$	$\text{EC}^a$	Soil	$\text{CM}^a$	Sea Salt	Rayleigh	Type
	$\mu\text{g}/\text{m}^3^a$							$\text{Mm}^{-1}^a$	
Dolly Sods Wilderness	0.23	0.10	1.80	0.02	0.43	2.19	0.02	10	Annual
Otter Creek Wilderness	0.23	0.10	1.80	0.02	0.43	2.19	0.02	10	Annual
James River Face Wilderness	0.23	0.10	1.80	0.02	0.48	3.00	0.02	11	Annual
Shenandoah National Park	0.23	0.10	1.80	0.02	0.41	2.88	0.02	10	Annual

Source: USFS, NPS, and USFWS, 2010

(a)  $(\text{NH}_4)_2\text{SO}_4$  = ammonium sulfate,  $\text{NH}_4\text{NO}_3$  = ammonium nitrate, OM = organic mass, EC = elemental carbon, CM = coarse mass,  $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter;  $\text{Mm}^{-1}$  = inverse megameters

Extinction coefficients for hygroscopic species can be computed using different values. For this analysis, the M8\_MODE parameter of 5 will be used to conform to the FLAG 2010 recommendations, which utilizes monthly RHFSML, RHFLRG, and RHFSEA with daily modeled and monthly background concentrations. For this Class I visibility analysis, monthly average relative humidity factor values

developed by EPA for large hygroscopic particles, small hygroscopic particles, and sea salt will be used and are specified in Table 5-2 for each Class I area.

**Table 5-2: Monthly Relative Humidity Adjustment Factors for Each Class I Area**

Parameter <sup>a</sup>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Dolly Sods Wilderness</b>												
$f_L(RH)$	2.53	2.39	2.38	2.20	2.63	2.65	2.74	2.90	2.94	2.65	2.45	2.61
$f_S(RH)$	3.39	3.16	3.17	2.87	3.63	3.62	3.78	4.06	4.15	3.63	3.27	3.53
$f_{SS}(RH)$	3.60	3.35	3.31	3.03	3.66	3.76	3.91	4.12	4.16	3.72	3.47	3.72
<b>Otter Creek Wilderness</b>												
$f_L(RH)$	2.55	2.41	2.40	2.23	2.64	2.69	2.80	2.96	3.00	2.69	2.48	2.63
$f_S(RH)$	3.41	3.20	3.20	2.91	3.64	3.70	3.88	4.18	4.26	3.72	3.32	3.56
$f_{SS}(RH)$	3.63	3.40	3.34	3.06	3.67	3.82	3.98	4.19	4.23	3.78	3.51	3.76
<b>James River Face Wilderness</b>												
$f_L(RH)$	2.44	2.30	2.29	2.12	2.47	2.58	2.65	2.78	2.82	2.57	2.36	2.51
$f_S(RH)$	3.25	3.03	3.02	2.72	3.31	3.48	3.59	3.83	3.91	3.48	3.11	3.38
$f_{SS}(RH)$	3.43	3.19	3.16	2.90	3.46	3.69	3.79	3.97	4.00	3.61	3.31	3.56
<b>Shenandoah National Park</b>												
$f_L(RH)$	2.44	2.28	2.29	2.12	2.45	2.56	2.65	2.79	2.81	2.53	2.34	2.55
$f_S(RH)$	3.26	2.99	3.02	2.72	3.28	3.46	3.59	3.85	3.91	3.41	3.08	3.44
$f_{SS}(RH)$	3.44	3.17	3.17	2.90	3.42	3.66	3.78	3.97	3.98	3.56	3.28	3.62

Source: USFS, NPS, and USFWS, 2010

(a)  $f_L(RH)$  = relative humidity adjustment factor for large sulfate and nitrate;  $f_S(RH)$  = relative humidity adjustment factor for small sulfate and nitrate;  $f_{SS}(RH)$  = relative humidity adjustment factor for sea salt

The purpose of the visibility analysis is to calculate the change in light extinction when comparing the background visibility to the predicted value at each receptor for each day (24-hour period) of the year due to the Project sources.

Processing of visibility impairment will be carried out using the CALPUFF post-processor CALPOST using Method 8. The 98th percentile in light extinction, which is the 8th highest daily value for each year, will be calculated and will be compared to the level of acceptable change of 5.0 percent.

## 6.0 NITROGEN AND SULFUR DEPOSITION ANALYSIS

A deposition analysis will be performed to evaluate deposition-induced changes from nitrogen (N) and sulfur (S). The FLMs developed a “Deposition Analysis Threshold” (DAT) value and guidance to evaluate the impact of additional N or S deposition on lands under their management. A DAT is “the additional amount of nitrogen or sulfur deposition within a FLM area, below which estimated impacts from a proposed new or modified source are considered negligible” (NPS, 2011). The modeled N and S deposition rates will be compared to the DAT for eastern states, which is 0.010 kilograms per hectare per year (kg/ha/yr) for N and S (NPS, 2011).

The impacts are considered negligible if the Project deposition impacts are below the DATs. If the deposition analysis does not result in any impacts above the DAT, no further analysis will be conducted. If the impacts are equal to or greater than the DAT, then the FLMs will be consulted to determine the need for a refined analysis.

N deposition is due to  $\text{HNO}_3$ ,  $\text{NO}_3$ ,  $\text{NO}_x$ , and  $\text{SO}_4$  (with wet and dry deposition for each  $[\text{NH}_4]_2\text{SO}_4$  and  $\text{NH}_4\text{NO}_3$ ). S deposition is also due to wet and dry deposition from  $\text{SO}_2$  and  $\text{SO}_4$ . Default data for deposition parameters will be used in the CALPUFF file.

Total deposition is weighted as the summation of wet and dry deposition from both N and S. The N and S deposition are calculations performed by the POSTUTIL and CALPOST programs. The recommended POSTUTIL scaling factors for the deposition calculations will be used and will be calculated as follows (Anderson, 2011):

$$\begin{aligned}\text{Total N Deposition} &= 0.29167 * (\text{total } \text{SO}_4 \text{ deposition}) + 0.22222 * (\text{total } \text{HNO}_3 \text{ deposition}) + \\ &\quad 0.45161 * (\text{total } \text{NO}_3 \text{ deposition}) + 0.30435 * (\text{total } \text{NO}_x \text{ deposition}) \\ \text{Total S Deposition} &= 0.5 * (\text{total } \text{SO}_2 \text{ deposition}) + 0.333 * (\text{total } \text{SO}_4)\end{aligned}$$

A conversion factor of 315.36 will be applied to the CALPOST file to convert the output units of micrograms per square meter per second ( $\mu\text{g}/\text{m}^2/\text{s}$ ) to kg/ha/yr. Therefore, the  $\mu\text{g}/\text{m}^2/\text{s}$  result in the output file will be in kg/ha/yr.

## **7.0 INPUT FILES AND CONCURRENCE**

This modeling protocol is being submitted to the FLMs and WVDEP for approval prior to finalizing the Class I visibility and deposition modeling for the Project. Included with this protocol are CALPUFF, CALPOST, and POSTUTIL input files for review and comment.

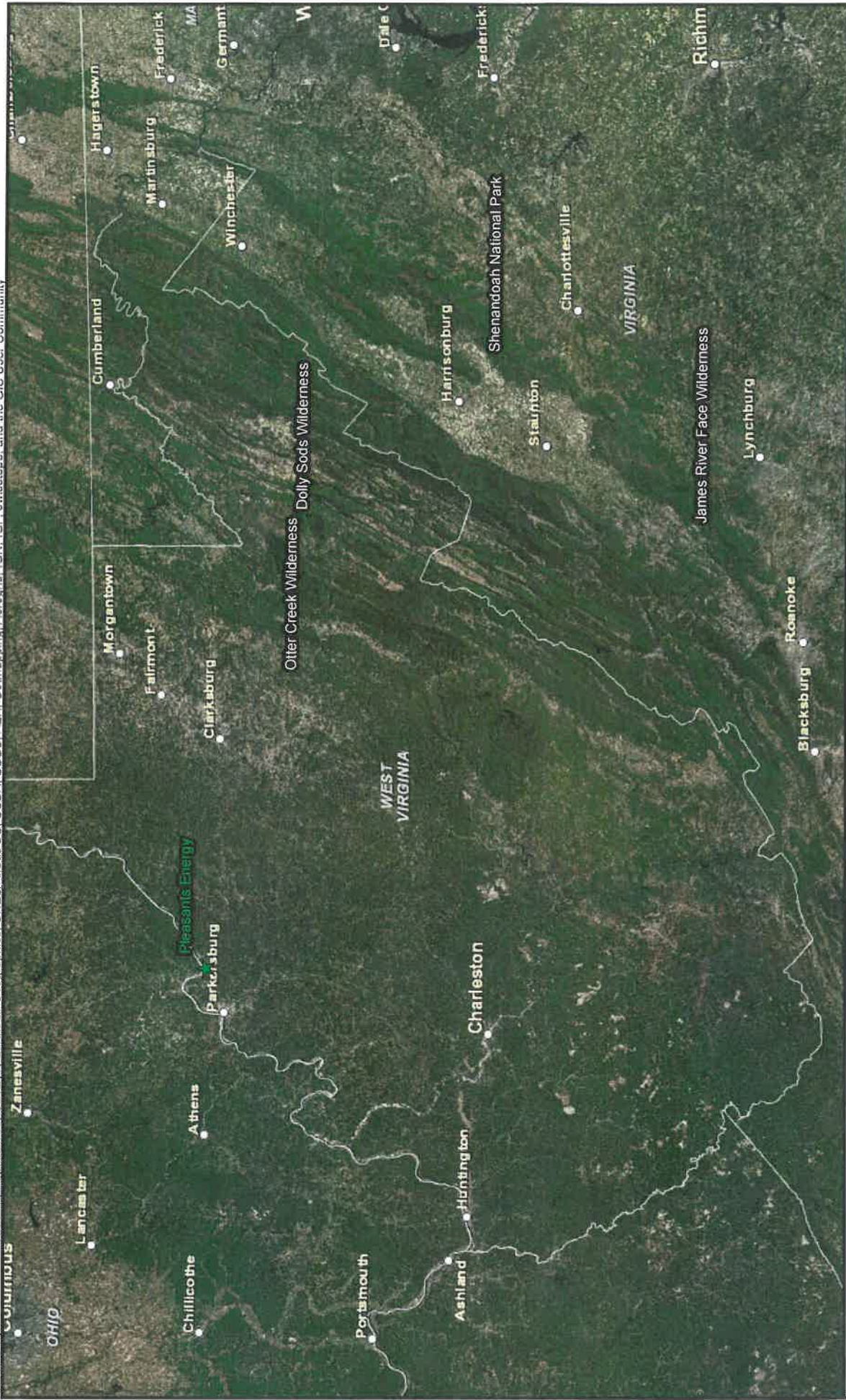
Once discussion and concurrence on the modeling methodologies are finalized, the final visibility and deposition modeling will be performed and final report will be submitted to the FLMs and WVDEP.

## 8.0 REFERENCES

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- Scire, J.S., F.R. Robe, M.E. Fernau, and R.J. Yamartino. (2000b, January). *A User's Guide for the CALMET Meteorological Model (Version 5)*. Earth Tech, Inc.
- U.S. Environmental Protection Agency. (1998, December). *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts*. EPA-454/R-98-019.
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## APPENDIX A - FIGURES





★ Pleasants Energy (Project Location)

USFS Class I

NPS Class I



40 20 0 40

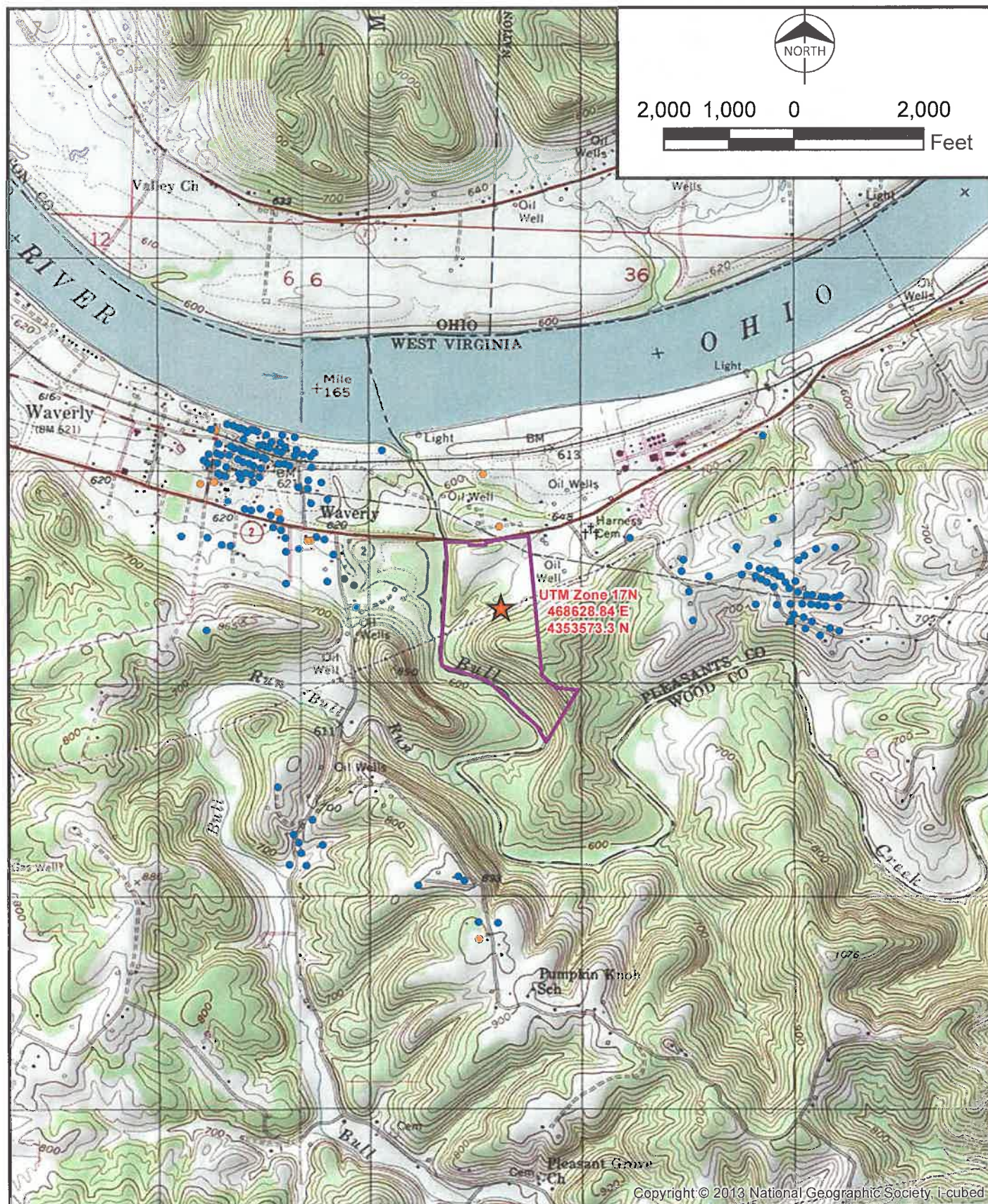


Kilometers



Figure A-1  
Project Location & Class I Areas  
Pleasants Energy, LLC





## Legend

- Business
- House
- †† Cemetery
- ★ Project Location
- Property Boundary

**BURNS  
 McDONNELL**

**Figure A-2**  
**Area Map**  
**Pleasants Energy, LLC**



## **APPENDIX B – EMISSIONS CALCULATIONS**

**Pleasants Energy, LLC - PSD Project  
Fuel Oil and Natural Gas Overall Emissions for Turbines 1 & 2  
Annual Emission Rates for Deposition Analysis**

**Project Emissions Estimates (Maximum Potential to Emit)**

Pollutant	Maximum Emissions - Each Combustion Turbine <sup>a</sup>	Annualized Maximum Emissions - Each Combustion Turbine	
	(tpy)	(lb/hr)	(g/s)
NO <sub>x</sub>	232.3	53.04	6.68
SO <sub>2</sub>	8.2	1.88	0.24

(a) Emissions are based on worst-case emissions from any operating scenario. Based on annual NO<sub>x</sub> and SO<sub>2</sub> limits.

**Speciated Emissions**

Modeled Species Name	Emission Rates	
	lb/hr	g/s
SO <sub>2</sub>	1.13	0.14
SO <sub>4</sub> (inorganic CPM)	1.13	0.14

**Pleasants Energy, LLC - PSD Project**  
**Natural Gas Potential Emissions for Turbines 1 & 2**  
**24-hour Emission Rates for Visibility Analysis**

GT1 & GT2 combustion turbine size	1,571	MMBtu/hr
Number of combustion turbines (GT1 & GT2)	2	
Natural gas operation with turbophase	3,250	Hours per turbine
Number of natural gas starts per turbine	365	May include up to 20 starts on fuel oil.
Natural gas heating value	1,020	MMBtu/MMcf

**Natural Gas Operation Emissions**

Pollutant	100% Load With TurboPhase Emission Rate (lb/hr)	Natural Gas Start-up Emissions <sup>a</sup> (lb/hr)	Natural Gas Shutdown Emissions <sup>b</sup> (lb/hr)	Maximum 24-hour Emissions (lb/hr) <sup>c</sup>
NO <sub>x</sub>	75	121.2	103.3	90.08
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	20.2	18.0	18.0	20.2
SO <sub>2</sub>	2.8	2.5	2.5	2.80

(a) Assumes start-up is 120 minutes

(b) Assumes shutdown is 60 minutes

(c) Emissions are based on 3 start-ups and 3 shutdowns per day

**Pleasants Energy, LLC - PSD Project  
Emissions for Natural Gas Operation of Combustion Turbines  
24-hour Emission Rates for Visibility Analysis**

**Filterable PM (EC) Emissions**

Modeled Species Name	Median Diameter µm	Size Distribution %	Filterable PM (EC) Fraction	Filterable PM (EC) Emission Rates	
				lbs/hr	g/s
PM0005	0.05	15	0.15	0.76	0.0954
PM0010	0.10	40	0.25	1.26	0.1591
PM0015	0.15	63	0.23	1.16	0.1463
PM0020	0.20	78	0.15	0.76	0.0954
PM0025	0.25	89	0.11	0.56	0.0700
PM0100	1.00	100	0.11	0.56	0.0700
		<b>Total (SUM)</b>	<b>1.00</b>	<b>5.05</b>	<b>0.6363</b>

Modeled Species Name	Emission Rate	
	lb/hr	g/s
SO <sub>2</sub>	1.87	0.24
SO <sub>4</sub> (inorganic CPM)	1.40	0.18
NO <sub>x</sub>	90.08	11.35
SOA (organic CPM)	13.75	1.73

**Pleasants Energy, LLC - PSD Project**  
**Emissions for Natural Gas Operation of Combustion Turbines**  
**24-hour Emission Rates for Visibility Analysis**

Source: <http://www.nature.nps.gov/air/permits/ect/ectGasFiredCT.cfm>

Example of Consensus Approach where H2SO4 emissions are not provided by applicant  
Applicant's estimates are in **bold**.

Turbine	Heat Input (mmBtu/hr)	Filterable PM (25% Estimate) (lb/mmBtu)	Condensible PM (75% Estimate) (lb/mmBtu)	Total PM (Applicant) (lb/mmBtu)	SO2 (Applicant) (lb/hr)
GE 7FA	1571	5.05	15.15	20.20	2.0
					2.80

SO4 (lb/hr)	
	1.40

SO2 (Applicant-33%) (lb/hr)	
	1.87

Organic Carbon (lb/hr)	
	13.75

**Impact of Consensus Combined Cycle Turbine Example on Extinction**

Type	Name	Extinction Coef.	f(RH)*	Efficiency	Emissions (lb/hr)	Total Relative ext 1/Mm
Filterable	EC	10		10	5.05	50.50
Inorganic CPM	SOIL	1		1		0.00
Inorganic CPM	SO4	3	2	6	1.40	8.40
Organic CPM	SOA	4		4	13.75	55.00
						113.90

\* f(RH) will vary

comparison from AP-42

Turbine	Heat Input (mmBtu/hr)	Filterable PM (AP-42) (lb/mmBtu)	Condensible PM (AP-42) (lb/mmBtu)	Total PM (AP-42) (lb/mmBtu)	SO2 (AP-42) (lb/hr)
GE 7FA	1571	0.0019	0.0047	0.0066	0.94
					0.004
					5.34

**Pleasants Energy, LLC - PSD Project**  
**Fuel Oil Potential Emissions for Turbines 1 & 2**  
**24-hour Emission Rates for Visibility Analysis**

GT1 & GT2 combustion turbine size	1,570	MMBtu/hr
Number of combustion turbines (GT1 & GT2)	2	
Number of fuel oil starts per turbine	20	
Fuel oil (#2) heating value	0.14	MMBtu/gal
Fuel consumption rate	11,214	gal/hr

**Fuel Oil Operation Emissions**

Pollutant	100% Load Fuel Oil Emission Rate (lb/hr)	Start-up Emissions (lb/hr) <sup>a</sup>	Shutdown Emissions (lb/hr) <sup>b</sup>	Maximum 24-hour Emissions (lb/hr) <sup>c</sup>
NO <sub>x</sub>	470	561.6	543.1	480.68
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	39	39.0	39.0	39.0
SO <sub>2</sub> <sup>e</sup>	3.09	3.09	3.09	3.09

(a) Assumes start-up is 120 minutes

(b) Assumes shutdown is 60 minutes

(c) Emissions are based on 1 start-up and 1 shutdown per day

**Pleasants Energy, LLC - PSD Project**  
**Emissions for Fuel Oil Operation of Combustion Turbines**  
**24-hour Emission Rates for Visibility Analysis**

**Filterable PM (EC) Emissions**

Modeled Species Name	Median Diameter µm	Size Distribution %	Filterable PM (EC) Fraction	Filterable PM (EC) Emission Rates	
				lbs/hr	g/s
PM0005	0.05	15	0.15	1.08	0.1364
PM0010	0.10	40	0.25	1.80	0.2273
PM0015	0.15	63	0.23	1.66	0.2091
PM0020	0.20	78	0.15	1.08	0.1364
PM0025	0.25	89	0.11	0.79	0.1000
PM0100	1.00	100	0.11	0.79	0.1000
<b>Total (SUM)</b>			<b>1.00</b>	<b>7.22</b>	<b>0.9091</b>

Modeled Species Name	Emission Rates	
	lb/hr	g/s
SO <sub>2</sub>	1.85	0.23
SO <sub>4</sub> (inorganic CPM)	1.85	0.23
NO <sub>x</sub>	480.68	60.56
SOA (organic CPM)	22.72	2.86
SOIL (filterable PM)	7.22	0.91

**Pleasants Energy, LLC - PSD Project  
Emissions for Fuel Oil Operation of Combustion Turbines  
24-hour Emission Rates for Visibility Analysis**

Source: <https://www.nature.nps.gov/air/permits/ect/ectOilFiredBoiler.cfm>

Example of Consensus Approach where H<sub>2</sub>SO<sub>4</sub> emissions are not provided by applicant  
Applicant's estimates are in **BOLD**.

Heat Input		Filterable PM (37% Estimate)	Condensible PM (63% Estimate)	Total PM (Applicant)		SO <sub>2</sub> (Applicant)	
Turbine	(mmBtu/hr)	(lb/hr)	(lb/mmBtu)	(lb/hr)	(lb/mmBtu)	%S	(lb/hr)
GE 7FA	1571	0.0092	14.43	0.0156	24.57	0.0248	<b>39.00</b>
					0.002	0.01	<b>3.09</b>

SO <sub>2</sub> (Applicant-40%)
(lb/hr)
1.85

SO <sub>4</sub>
(lb/hr)
1.85

Organic Carbon
(lb/hr)
22.72

EC
(lb/hr)
7.22

Soils
(lb/hr)
7.22

**Impact of Turbine Example on Extinction**

Type	Name	Extinction Coef.	f(RH)*	Efficiency	Emissions (lb/hr)	Total Relative Extinction 1/Mm	Coarse Fine Soil Fine EC CPM IOR CPM OR
Fine	EC	10		10	7.22	72.15	0%
Fine	SOIL	1		1	7.22	7.22	19%
Inorganic CPM	SO <sub>4</sub>	3	2	6	1.85	11.12	19%
Organic CPM	SOA	4		4	22.72	90.86	5%
						181.35	58%
							100%

comparison from AP-42

Heat Input		Filterable PM (AP-42)	Condensible PM (AP-42)	Total PM (AP-42)		SO <sub>2</sub> (AP-42)	
Turbine	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/mmBtu)	(lb/hr)	%S	(lb/hr)
GE 7FA	1571	0.0072	11.31	0.0072	11.31	0.0144	22.62
					0.0144	1.01	0.01
							15.87





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## **APPENDIX C - EMISSIONS CALCULATIONS**

**Pleasants Energy, LLC - PSD Project**  
**Fuel Oil and Natural Gas Overall Emissions for Turbines 1 & 2**  
**Annual Emission Rates for Deposition Analysis**

**Project Emissions Estimates (Maximum Potential to Emit)**

Pollutant	Maximum Emissions - Each Combustion Turbine <sup>a</sup>	Annualized Maximum Emissions - Each Combustion Turbine	
	(tpy)	(lb/hr)	(g/s)
NO <sub>x</sub>	232.3	53.04	6.68
SO <sub>2</sub>	8.2	1.88	0.24

(a) Emissions are based on worst-case emissions from any operating scenario. Based on annual NO<sub>x</sub> and SO<sub>2</sub> limits.

**Speciated Emissions**

Modeled Species Name	Emission Rates	
	lb/hr	g/s
SO <sub>2</sub>	1.13	0.14
SO <sub>4</sub> (inorganic CPM)	1.13	0.14

**Pleasants Energy, LLC - PSD Project**  
**Natural Gas Potential Emissions for Turbines 1 & 2**  
**24-hour Emission Rates for Visibility Analysis**

GT1 & GT2 combustion turbine size	1,571	MMBtu/hr
Number of combustion turbines (GT1 & GT2)	2	
Natural gas operation with turbophase	3,250	Hours per turbine
Number of natural gas starts per turbine	365	May include up to 20 starts on fuel oil.
Natural gas heating value	1,020	MMBtu/MMcf

**Natural Gas Operation Emissions**

Pollutant	100% Load With Turbophase Emission Rate (lb/hr)	Natural Gas Start-up Emissions <sup>a</sup> (lb/hr)	Natural Gas Shutdown Emissions <sup>b</sup> (lb/hr)	Maximum 24-hour Emissions (lb/hr) <sup>c</sup>
NO <sub>x</sub>	75	121.2	103.3	90.08
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	20.2	18.0	18.0	20.2
SO <sub>2</sub>	2.8	2.5	2.5	2.80

(a) Assumes start-up is 120 minutes

(b) Assumes shutdown is 60 minutes

(c) Emissions are based on 3 start-ups and 3 shutdowns per day

**Pleasants Energy, LLC - PSD Project  
Emissions for Natural Gas Operation of Combustion Turbines  
24-hour Emission Rates for Visibility Analysis**

**Filterable PM (EC) Emissions**

Modeled Species Name	Median Diameter µm	Size Distribution %	Filterable PM (EC) Fraction	Filterable PM (EC) Emission Rates	
				lbs/hr	g/s
PM0005	0.05	15	0.15	0.76	0.0954
PM0010	0.10	40	0.25	1.26	0.1591
PM0015	0.15	63	0.23	1.16	0.1463
PM0020	0.20	78	0.15	0.76	0.0954
PM0025	0.25	89	0.11	0.56	0.0700
PM0100	1.00	100	0.11	0.56	0.0700
		<b>Total (SUM)</b>	<b>1.00</b>	<b>5.05</b>	<b>0.6363</b>

Modeled Species Name	Emission Rate	
	lb/hr	g/s
SO <sub>2</sub>	1.87	0.24
SO <sub>4</sub> (inorganic CPM)	1.40	0.18
NO <sub>x</sub>	90.08	11.35
SOA (organic CPM)	13.75	1.73

**Pleasants Energy, LLC - PSD Project  
Emissions for Natural Gas Operation of Combustion Turbines  
24-hour Emission Rates for Visibility Analysis**

Source: <http://www.nature.nps.gov/air/permits/ect/ectGasFiredCT.cfm>

Example of Consensus Approach where H<sub>2</sub>SO<sub>4</sub> emissions are not provided by applicant  
Applicant's estimates are in bold.

	Heat Input (mmBtu/hr)	Filterable PM (25% Estimate) (lb/mmBtu)	Condensible PM (75% Estimate) (lb/mmBtu)	Total PM (Applicant) (lb/mmBtu)	SO <sub>2</sub> (Applicant) (lb/hr)
Turbine					
GE 7FA	1571	5.05	15.15	20.20	2.80

SO <sub>4</sub> (lb/hr)
1.40

SO <sub>2</sub> (Applicant-33%) (lb/hr)
1.87

Organic Carbon (lb/hr)
13.75

**Impact of Consensus Combined Cycle Turbine Example on Extinction**

Type	Name	Extinction Coef.	f(RH)*	Efficiency	Emissions (lb/hr)	Total Relative Ext 1/Mm
Filterable	EC	10		10	5.05	50.50
Inorganic CPM	SOIL	1		1	0.00	0.00
Inorganic CPM	SO <sub>4</sub>	3	2	6	1.40	8.40
Organic CPM	SOA	4		4	13.75	55.00
						113.90

\* f(RH) will vary

comparison from AP-42

Turbine	Heat Input (mmBtu/hr)	Filterable PM (AP-42) (lb/mmBtu)	Condensible PM (AP-42) (lb/mmBtu)	Total PM (AP-42) (lb/mmBtu)	SO <sub>2</sub> (AP-42) (lb/hr)
GE 7FA	1571	0.0019	0.0047	0.0066	0.004
		2.98	7.38	10.37	5.34

**Pleasants Energy, LLC - PSD Project**  
**Fuel Oil Potential Emissions for Turbines 1 & 2**  
**24-hour Emission Rates for Visibility Analysis**

GT1 & GT2 combustion turbine size	1,570	MMBtu/hr
Number of combustion turbines (GT1 & GT2)	2	
Number of fuel oil starts per turbine	20	
Fuel oil (#2) heating value	0.14	MMBtu/gal
Fuel consumption rate	11,214	gal/hr

**Fuel Oil Operation Emissions**

	100% Load Fuel Oil Emission Rate (lb/hr)	Start-up Emissions (lb/hr) <sup>a</sup>	Shutdown Emissions (lb/hr) <sup>b</sup>	Maximum 24-hour Emissions (lb/hr) <sup>c</sup>
Pollutant				
NO <sub>x</sub>	470	561.6	543.1	480.68
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	39	39.0	39.0	39.0
SO <sub>2</sub> <sup>e</sup>	3.09	3.09	3.09	3.09

(a) Assumes start-up is 120 minutes

(b) Assumes shutdown is 60 minutes

(c) Emissions are based on 1 start-up and 1 shutdown per day

**Pleasants Energy, LLC - PSD Project**  
**Emissions for Fuel Oil Operation of Combustion Turbines**  
**24-hour Emission Rates for Visibility Analysis**

**Filterable PM (EC) Emissions**

Modeled Species Name	Median Diameter μm	Size Distribution %	Filterable PM (EC) Fraction	Filterable PM (EC) Emission Rates	
				lbs/hr	g/s
PM0005	0.05	15	0.15	1.08	0.1364
PM0010	0.10	40	0.25	1.80	0.2273
PM0015	0.15	63	0.23	1.66	0.2091
PM0020	0.20	78	0.15	1.08	0.1364
PM0025	0.25	89	0.11	0.79	0.1000
PM0100	1.00	100	0.11	0.79	0.1000
		<b>Total (SUM)</b>	<b>1.00</b>	<b>7.22</b>	<b>0.9091</b>

Modeled Species Name	Emission Rates	
	lb/hr	g/s
SO <sub>2</sub>	1.85	0.23
SO <sub>4</sub> (inorganic CPM)	1.85	0.23
NO <sub>x</sub>	480.68	60.56
SOA (organic CPM)	22.72	2.86
SOIL (filterable PM)	7.22	0.91



**Pleasants Energy, LLC - PSD Project  
Emissions for Fuel Oil Operation of Combustion Turbines  
24-hour Emission Rates for Visibility Analysis**

Source: <https://www.nature.nps.gov/air/permits/ect/ectOilFiredBoiler.cfm>

Example of Consensus Approach where H<sub>2</sub>SO<sub>4</sub> emissions are not provided by applicant  
Applicant's estimates are in **bold**.

Heat Input		Filterable PM (37% Estimate)		Condensible PM (63% Estimate)		Total PM (Applicant)		SO <sub>2</sub> (Applicant)	
Turbine	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/mmBtu)	(lb/hr)	(lb/mmBtu)	(lb/hr)	(lb/mmBtu)	(lb/hr)
GE 7FA	<b>1571</b>	<b>0.0092</b>	<b>14.43</b>	<b>0.0156</b>	<b>24.57</b>	<b>0.0248</b>	<b>39.00</b>	<b>0.002</b>	<b>0.01</b>

SO <sub>2</sub> (Applicant-40%)
(lb/hr)
<b>1.85</b>

SO <sub>4</sub>
(lb/hr)
<b>1.85</b>

Organic Carbon
(lb/hr)
<b>22.72</b>

EC
(lb/hr)
<b>7.22</b>

Soils
(lb/hr)
<b>7.22</b>

**Impact of Turbine Example on Extinction**

Type	Name	Extinction Coef.	f(RH)*	Efficiency	Emissions (lb/hr)	Total Relative Extinction 1/Mm	
Fine	EC	10		10	7.22	72.15	0%
Fine	SOIL	1		1	7.22	7.22	19%
Inorganic CPM	SO <sub>4</sub>	3	2	6	1.85	11.12	19%
Organic CPM	SOA	4		4	22.72	90.86	5%
						181.35	58%
							100%

Coarse  
Fine Soil  
Fine EC  
CPM IOR  
CPM OR

\* f(RH) will vary

comparison from AP-42

Heat Input		Filterable PM (AP-42)		Condensible PM (AP-42)		Total PM (AP-42)		SO <sub>2</sub> (AP-42)	
Turbine	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/mmBtu)	(lb/hr)	(lb/mmBtu)	(lb/hr)	(lb/mmBtu)	(lb/hr)
GE 7FA	<b>1571</b>	<b>0.0072</b>	<b>11.31</b>	<b>0.0072</b>	<b>11.31</b>	<b>0.0144</b>	<b>22.62</b>	<b>1.01</b>	<b>0.01</b>

15.87



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## Pursley, Steven R

---

**From:** Hauner-Davis, Mary <mhauner@burnsmcd.com>  
**Sent:** Wednesday, March 2, 2016 6:13 PM  
**To:** holly\_salazer@nps.gov; jalyn\_cummings@nps.gov; McClung, Jon D; andrea\_stacy@nps.gov; susan\_johnson@nps.gov; Kessler, Joseph R; Pursley, Steven R; john\_notar@nps.gov; mpitrolo@fs.fed.us; cbodea@fs.fed.us; baanderson02@fs.fed.us  
**Cc:** Adam.Birbeck@gdfsuezna.com; Gerald.Gatti@gdfsuezna.com; Gary.Vierling@gdfsuezna.com; Nelson, Minda  
**Subject:** Pleasants Energy Class I Visibility and Deposition Modeling Report  
**Attachments:** Pleasants Class I Visibility and Deposition Report 03-02-16.pdf

All:

FILE:	
COMPANY	<i>Plasants Energy</i>
FACILITY	<i>Waverly</i>
REGION	<i>2</i>
REG.	<i>14-00341</i>

*073-00022*

Attached, please find the final report on the Class I Visibility and Deposition Modeling for the Pleasants Energy facility. As requested, a hard copy of the report and a USB drive with all of the CALPUFF modeling files have been sent to Jon McClung at WV DEP, Bret Anderson at USDA Forest Service and John Notar at National Park Service. These packages should arrive via Fed-Ex to your offices tomorrow.

Please review the modeling report and files. We look forward to hearing from you soon. I will coordinate a conference call in the near future to discuss the report and modeling.

Thank you for your time and we look forward to your review of the positive results from the modeling.

Mary Hauner-Davis

**Mary Hauner-Davis \ Burns & McDonnell**  
**Manager, Air/Noise Department \ Env. Studies and Permitting**  
O 816-822-4252 \ M 402-730-9631 \ F 816-822-4299  
[mhauner@burnsmcd.com](mailto:mhauner@burnsmcd.com) \ burnsmcd.com  
9400 Ward Parkway \ Kansas City, MO 64114



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NON-CONFIDENTIAL

## Pursley, Steven R

**From:** O'Dea, Claire B -FS <cbodea@fs.fed.us>  
**Sent:** Monday, February 1, 2016 9:10 AM  
**To:** mhauner@burnsmcd.com  
**Cc:** Adam.Birbeck@gdfsuezna.com; holly\_salazar@nps.gov; jalyn\_cummings@nps.gov; McClung, Jon D; andrea\_stacy@nps.gov; susan\_johnson@nps.gov; Gerald.Gatti@gdfsuezna.com; Kessler, Joseph R; Pursley, Steven R; John\_Notar@nps.gov; Pitrolo, Melanie -FS; Gary.Vierling@gdfsuezna.com; mnelson@burnsmcd.com; Anderson, Bret A -FS  
**Subject:** USFS Comments RE: Draft Pleasants Energy, LLC Class I Visibility and Deposition Modeling Protocol

Hi Mary,

Thank you for the opportunity to provide comment on the Pleasant Energy protocol and the opportunity to speak with you last Thursday. As a follow up to our conversation, I wanted to summarize the comments that we offered on Thursday's call.

The protocol identified speciation profiles and general particle size distribution categories to be used for the current modeling analysis. The current FS guidance is mostly silent with respect to the use of speciation profiles and size distribution categories. We concur with NPS that understanding the impacts of EC, OC, and SO<sub>4</sub> can be important as these components of PM have greater light extinction efficiency than treatment of primary PM in a generalized manner. Unfortunately, information on direct PM emissions speciation for these source types and fuels is limited. As a general rule, without a firm understanding of the relationship of emission unit types and fuels combusted of the proposed project to the underlying source test data that form the basis of the aforementioned information used to generate speciated emissions, we would not request applicants to complete that step. Since the protocol already identifies that speciation and size distribution information will be utilized, we are not requesting that anything be done differently for this project.

Additionally, our review of the POSTUTIL sample files indicated that the ammonia limiting method (ALM) was not used as a post-processing step, nor was it discussed in the protocol. We normally recommend that ALM be utilized with program control option MNTITRATE set to 1. Representative monthly ammonia values should be used in conjunction with the MNITRATE option. We recommend that concurrence with the FLM's on these ammonia values be sought in advance if you choose to employ this post-processing step.

Again, we are not requesting changes to the modeling protocol, but in the interest of clarity we did want to identify the specifics to support the comment that we articulated on the call. Thank you again for allowing us time to discuss the protocols amongst the Federal Land Managers.

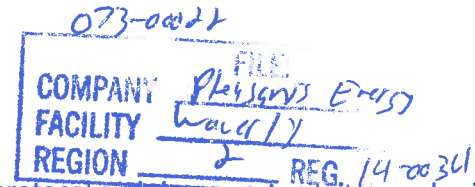
Best,



Claire O'Dea, PhD  
Air Quality Specialist  
Forest Service  
Eastern Regional Office

p: 202-205-1686  
c: 919-368-8879  
[cbodea@fs.fed.us](mailto:cbodea@fs.fed.us)

1400 Independence Ave, SW, #1121  
Washington, DC 20250



NON-CONFIDENTIAL

## Pursley, Steven R

---

**From:** Hauner-Davis, Mary <mhauner@burnsmcd.com>  
**Sent:** Monday, January 11, 2016 11:42 AM  
**To:** McClung, Jon D  
**Cc:** Birbeck, Adam Bruce <Adam.Birbeck@gdfsuezna.com>  
(Adam.Birbeck@gdfsuezna.com); Nelson, Minda; Pursley, Steven R  
**Subject:** PSD Class I Increment Modeling  
**Attachments:** Pleasants Class I Increment Modeling Protocol 1-11-16.pdf; 2001 OTCR\_PE calpost\_PM25\_24FO\_INC.INP; 2001\_PE\_CALPUFF\_24FO\_INC.INP; 2001 JARI\_PE calpost\_PM25\_24FO\_INC.INP

Hi Jon:

We prepared a separate PSD Class I increment modeling protocol for Pleasants Energy (for 24-hour PM2.5 fuel oil operation for two of the Class I areas). I have attached the protocol and sample input files for your review.

Since West Virginia has jurisdiction over the PSD Class I Increment, we are only sending the increment files to you. Please let me know if you believe that the increment data also needs to be sent to the FLMs.

Thank you for all of your time on this project. We look forward to hearing your comments on the protocols!

**Mary Hauner-Davis \ Burns & McDonnell**  
Manager, Air/Noise Department \ Env. Studies and Permitting  
O 816-822-4252 \ M 402-730-9631 \ F 816-822-4299  
[mhauner@burnsmcd.com](mailto:mhauner@burnsmcd.com) \ [burnsmcd.com](http://burnsmcd.com)  
9400 Ward Parkway \ Kansas City, MO 64114

073-00022

FILE	
COMPANY	Plasants Energy
FACILITY	Ward/1
REGION	2 REG. 4-0021



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## Pursley, Steven R

---

**From:** mhauner@burnsmcd.com  
**Sent:** Friday, January 8, 2016 4:46 PM  
**To:** Adam.Birbeck@gdfsuezna.com; holly\_salazar@nps.gov; jalyn\_cummings@nps.gov; McClung, Jon D; andrea\_stacy@nps.gov; susan\_johnson@nps.gov; Gerald.Gatti@gdfsuezna.com; Kessler, Joseph R; Pursley, Steven R; john\_notar@nps.gov; mpitrolo@fs.fed.us; Gary.Vierling@gdfsuezna.com; mnelson@burnsmcd.com; cbodea@fs.fed.us; baanderson02@fs.fed.us  
**Subject:** Draft Pleasants Energy, LLC Class I Visibility and Deposition Modeling Protocol

---

**You have received 2 secure files from mhauner@burnsmcd.com.**  
Use the secure links below to download.

---

All:

Attached to this email is the draft Class I Visibility and Deposition Modeling Protocol for the Pleasants Energy PSD Project located near Waverly, West Virginia. We have discussed this project with you recently and are now submitting a modeling protocol with sample input files for your review.

Please download the files and review them at your convenience. We would like to hold a conference call to gather your comments on the protocol and model input files either next Thursday (1/14) or the following week. I will send out a doodle poll after this email for you to enter in your availability for a call to discuss these items.

Thank you for your time in reviewing the protocol and we look forward to discussing it with you in the next couple of weeks. If you have any issues downloading the protocol or the input files, please do not hesitate to contact me at mhauner@burnsmcd.com or 816-822-4252.

Thanks and have a good weekend!

Mary Hauner-Davis

Mary Hauner-Davis \ Burns & McDonnell  
Manager, Air/Noise Department \ Env. Studies and Permitting  
O 816-822-4252 \ M 402-730-9631 \ F 816-822-4299  
mhauner@burnsmcd.com \ burnsmcd.com  
9400 Ward Parkway \ Kansas City, MO 64114

073-00021

FILE:	
COMPANY	Pleasant Energy
FACILITY	Waverly
REGION	2
REG.	14-0034

### Secure File Downloads:

Available until: 22 January 2016

Click links to download:

[CALPUFF Visibility Files.zip](#)  
244.56 KB

[Pleasants Class I Visibility and Deposition Modeling Protocol 1-8-16.pdf](#)  
3.28 MB

You have received attachment link(s) within this email sent via Burns & McDonnell Secure File Transfer. To retrieve the attachment(s), please click on the link(s). If you are a new user you will be required to create an account in order to download the attachment(s).

---

Secured by Accellion



## Pursley, Steven R

**From:** Pitrolo, Melanie -FS <mpitrolo@fs.fed.us>  
**Sent:** Wednesday, October 21, 2015 2:29 PM  
**To:** Birbeck, Adam Bruce <Adam.Birbeck@gdfsuezna.com>  
(Adam.Birbeck@gdfsuezna.com); Robbins, Emily C; 'Gatti, Gerald'; Pursley, Steven R;  
Vierling, Gary; Kessler, Joseph R; Homnick, Peter; Hauner-Davis, Mary  
**Cc:** O'Dea, Claire B -FS; Anderson, Bret A -FS  
**Subject:** FW: Q/d calculation for Pleasants Energy LLC

**From:** Pitrolo, Melanie -FS  
**Sent:** Thursday, October 08, 2015 11:51 AM  
**To:** O'Dea, Claire B -FS; Anderson, Bret (baanderson02@fs.fed.us)  
**Subject:** Q/d calculation for Pleasants Energy LLC

073-00021

COMPANY	FILE: Pleasants Energy
FACILITY	Waverly
REGION	2 REG. 14-0034

- Fuel Limitation is 19,081,721,568 SCF/yr, with a fuel oil factor of 889 SCF/gal (page 19 of the application)
  - o Thus, fuel oil limitation is 21,464,254 gal/yr
- Hourly Fuel Oil Consumption Rate (found on page 133 of the application) = 11,214 gal
- Number of allowable hours on fuel oil =  $21464254 / 11214 = 1914$  hours/year
- Proposed annual permit limitations (NOx + SO2 + PM + SAM) = 628.3 tons/year
- FLAG Method of Calculating Q
  - o  $8760 / 1914 * 628.3$
  - o  $Q = 2875.6$
- Q/d Calculations:
  - o Otter Creek (d=130km) = 22.1
  - o Dolly Sods (d=160km) = 18.0
  - o Shenandoah (d=200km) = 14.4
  - o James River Face (d=253km) = 11.4

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## Pursley, Steven R

---

**Subject:** Pleasants Energy PSD Permit Application and Visibility Analysis  
**Location:** Conference Call

**Start:** Wed 10/21/2015 9:00 AM  
**End:** Wed 10/21/2015 10:00 AM

**Recurrence:** (none)

**Meeting Status:** Accepted

**Organizer:** Hauner-Davis, Mary

073-00022

FILE:	
COMPANY	Pleasants Energy
FACILITY	Waverly
REGION	2
REG.	14-0034

Please join us for a call to discuss Class I visibility for the Pleasants Energy PSD Air Permit Application.

Wednesday, Oct 21 at 8 am CDT (9 AM EDT)

Call-in number: 866-429-9395

Conference code: 8168224252#

**Mary Hauner-Davis \ Burns & McDonnell**  
Manager, Air/Noise Department \ Env. Studies and Permitting  
O 816-822-4252 \ M 402-730-9631 \ F 816-822-4299  
[mhauner@burnsmcd.com](mailto:mhauner@burnsmcd.com) \ [burnsmcd.com](http://burnsmcd.com)  
9400 Ward Parkway \ Kansas City, MO 64114

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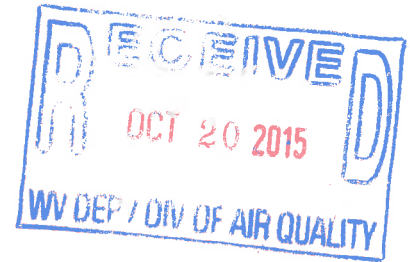
0.19  
at  
FLAG

22.1 O/D for other creek - 1/9/12  
Sediment

**GDF SUEZ**

073-00022

FILE:	
COMPANY	
FACILITY	
REGION	REG.



October 19, 2015

Beverly McKeone  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304

Re: PSD Air Permit Application  
Pleasants Energy, LLC  
Waverly Facility  
Plant ID No. 073-00022  
Application No. R14-0034

Dear Ms. McKeone:

In response to the email from Steven Pursley on October 12, 2015, enclosed please find an original Affidavit of Publication for the legal notice required for the above referenced permit application. This notice was revised to correct "45CSR13" to "45CSR14". We apologize for this error that was in the previous legal notice. We also revised the phone extension as requested.

Please contact me directly if you have any questions regarding the enclosed documents.

Regards,

A handwritten signature in black ink, appearing to read "Gerald M. Gatti".

**Gerald M. Gatti**  
Plant Manager  
Pleasants Energy, LLC  
10319 South Pleasants Highway  
St. Marys, WV 26170  
Direct 304-665-4201  
Fax 304-665-4218  
[gerald.gatti@gdfsuezna.com](mailto:gerald.gatti@gdfsuezna.com)

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# Pleasants County Leader

Ph. 304.684.2424 • Fax 304.684.2426  
P.O. Box 27, St. Marys, WV 2670

WEST CENTRAL PUBLISHING  
FEDERAL I.D. NO. 55-06700561

STATE OF WEST VIRGINIA  
COUNTY OF PLEASANTS, to wit:

I, James McGoldrick, being first duly sworn upon my oath, do depose and say:

- that I am Publisher of Pleasants County Leader, a Republican newspaper,
- that I have been duly authorized to execute this affidavit,
- that such newspaper is regularly published weekly for at least fifty weeks during the calendar year, in the municipality of St. Marys, Pleasants County, West Virginia.
- That such newspaper is a newspaper of "general circulation" as defined in Art. 3, Chap. 59 of the Code of West Virginia 1931 as amended, within St. Marys and Pleasants County
- that such newspaper averages in length four or more pages, exclusive of any cover, per issue;
- that such newspaper is circulated to the general public at a definite price or consideration;
- that such newspaper is a newspaper to which the general public resorts for passing events or a political, religious, commercial and social nature and for current happenings, announcements, miscellaneous reading matters, advertisements and other notices;
- and that the annexed notice described as follows:

## Air Quality Permit Notice

WAS PUBLISHED IN SAID NEWSPAPER AS FOLLOWS:

TIMES	DATES
One	Oct. 17, 2015

**PUBLICATION CHARGES** \$42.69

## CERTIF-BILL TO

Pleasants Energy, LLC  
Gerald Gatti, Plant Manager  
10319 South Pleasants Hwy  
St. Marys, WV 26170

(signed) *James McGoldrick*

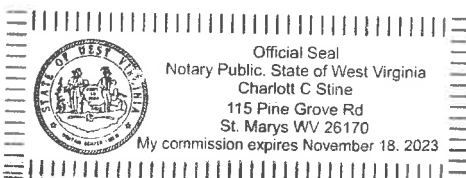
## NOTARIZATION

Taken, sworn to and subscribed before me this 19<sup>th</sup>

day of October, 20 15

*Charlotte C. Stine*

Notary Public



## AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that Pleasants Energy, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR14 Prevention of Significant Deterioration Major Source Construction Permit for the increase in operation of the existing simple combustion turbines. The facility is located on Latitude Longitude: 39.333, -81.365, 10319 South Pleasants Highway, St. Marys, in Pleasants County, West Virginia.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be: NOx: 464.62 tpy, CO: 509.5 tpy, VOC: 23.8 tpy, SO2: 39.0 tpy, PM10: 118.7 tpy, Total HAPs: 6.2 tpy.

Startup of operation is planned to begin on or before the First day of June, 2016. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57<sup>th</sup> Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 8260499, extension 1250, during normal business hours.

Dated this the 12th day of October, 2015.

By: Pleasants Energy, LLC  
Gerald Gatti  
Plant Manager  
10319 South Pleasants Highway  
St. Marys, WV 26170

**PLEASE RETURN A COPY OF THIS INVOICE WITH YOUR PAYMENT TO:**  
P.O. BOX 27, ST. MARYS, WV 26170

NON CONFIDENTIAL

**Pursley, Steven R**

---

**From:** Pursley, Steven R  
**Sent:** Monday, October 12, 2015 12:00 PM  
**To:** 'gerald.gatti@gdfsuezna.com'  
**Cc:** McKeone, Beverly D; 'mhauner@burnsmcd.com'; Birbeck, Adam Bruce  
<Adam.Birbeck@gdfsuezna.com> (Adam.Birbeck@gdfsuezna.com)  
**Subject:** WV DAQ Permit Application Incomplete for Company Name and Location

**RE: Application Status: Incomplete  
Pleasants Energy Facility, LLC  
Permit Application No. R14-0034  
Plant ID No. 073-00022**

Mr. Gatti:

Your application for a Major Construction permit for a natural gas fired, simple cycle electric peaking station was received by this Division on September 18, 2015 and assigned to the writer for review. Upon initial review of said application, it has been determined that the application as submitted is incomplete based on the following items:

1. As indicated in the September 21, 2015 email from Sandra Adkins of WVDAQ, the legal ad must be republished to indicate that the permit application is for a "45CSR14 Prevention of Significant Deterioration major source construction permit." Both your original ad and the ad ran on September 26 reference a "45CSR13" permit application. Additionally, when you re run the ad please change the phone extension from 1227 to 1250.

Please address the above deficiencies in writing within fifteen (15) days of the receipt of this email. Application review will not commence until the application has been deemed to be technically complete. Failure to respond to this request in a timely manner may result in the denial of the application.

Should you have any questions, please contact Steven R. Pursley at (304) 926-0499 ext. 1218 or reply to this email.

NON-CONFIDENTIAL



October 6, 2015

Beverly McKeone  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304

Re: PSD Air Permit Application  
Pleasants Energy, LLC  
Waverly Facility  
Plant ID No. 073-00022  
Application No. R14-0034

Dear Ms. McKeone:

In response to the email from Sandra K Adkins on September 21, 2015, enclosed please find the original Affidavit of Publication for the legal notice required for the above referenced permit application.

Please contact me directly if you have any questions regarding the enclosed documents.

Regards,

A handwritten signature in black ink, appearing to read "Gerald M. Gatti", with a stylized flourish at the end.

Gerald M. Gatti  
Plant Manager  
Pleasants Energy, LLC  
10319 South Pleasants Highway  
St. Marys, WV 26170  
Direct 304-665-4201  
Fax 304-665-4218  
[gerald.gatti@gdfsuezna.com](mailto:gerald.gatti@gdfsuezna.com)

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# Pleasants County Leader

Ph. 304.684.2424 • Fax 304.684.2426

P.O. Box 27, St. Marys, WV 2670

WEST CENTRAL PUBLISHING

FEDERAL I.D. NO. 55-06700561

STATE OF WEST VIRGINIA

COUNTY OF PLEASANTS, to wit:

I, Randa Gregg, being first duly sworn upon my oath, do depose and say:

- that I am General Manager of Pleasants County Leader, a Republican newspaper,
- that I have been duly authorized to execute this affidavit,
- that such newspaper is regularly published weekly for at least fifty weeks during the calendar year, in the municipality of St. Marys, Pleasants County, West Virginia.
- That such newspaper is a newspaper of "general circulation" as defined in Art. 3, Chap. 59 of the Code of West Virginia 1931 as amended, within St. Marys and Pleasants County
- that such newspaper averages in length four or more pages, exclusive of any cover, per issue;
- that such newspaper is circulated to the general public at a definite price or consideration;
- that such newspaper is a newspaper to which the general public resorts for passing events or a political, religious, commercial and social nature and for current happenings, announcements, miscellaneous reading matters, advertisements and other notices;
- and that the annexed notice described as follows:

## Air Quality Permit Notice

WAS PUBLISHED IN SAID NEWSPAPER AS FOLLOWS:

TIMES

DATES

One

Sept. 26, 2015

### PUBLICATION CHARGES

\$42.69

### PO#

### CERTIF-BILL TO

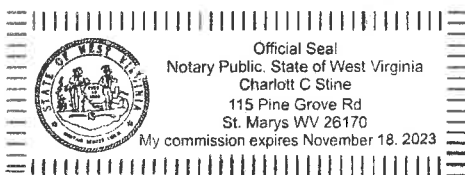
Pleasants Energy, LLC  
Gerald Gatti, Plant Manager  
10319 South Pleasants Hwy  
St. Marys, WV 26170

(signed)

### NOTARIZATION

Taken, sworn to and subscribed before me this 26<sup>th</sup>day of September, 20 15

Notary Public



**PLEASE RETURN A COPY OF THIS  
INVOICE WITH YOUR PAYMENT TO:**  
P.O. BOX 27, ST. MARYS, WV 26170

### AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that Pleasants Energy, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 Prevention of Significant Deterioration Major South Construction Permit for the increase in operation of the existing simple combustion turbines. The facility is located on Latitude: Longitude: 39.333, -81.365, 10319 South Pleasants Highway, St. Marys, in Pleasants County, West Virginia.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be: NOx: 464.62 tpy, CO: 509.5 tpy, VOC: 23.8 tpy, SO2: 39.0 tpy, PM10: 118.7 tpy, Total HAPs: 6.2 tpy.

Startup of operation is planned to begin on or before the First day of June, 2016. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57<sup>th</sup> Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 9260499, extension 1227, during normal business hours.

Dated this the 17th day of September, 2015.

By: Pleasants Energy, LLC  
Gerald Gatti  
Plant Manager  
10319 South Pleasants Highway  
St. Marys, WV 26170

9-26 L

NON-CONFIDENTIAL

**Pursley, Steven R**

---

**From:** Ward, Beth A  
**Sent:** Tuesday, September 22, 2015 11:26 AM  
**To:** Pursley, Steven R  
**Subject:** PLEASANTS ENERGY PERMIT APPLICATION FEE  
  
**Categories:** Red Category

This is the receipt for payment received from:

PLEASANTS ENERGY, LLC, WAVERLY, CHECK NUMBER 001883, CHECK DATE 09/10/2015, \$11,000.00.  
R14-0034 ID#073-00022

OASIS Deposit CR 1600032365

*Beth Ward*

WV DEPARTMENT OF ENVIRONMENTAL PROTECTION  
601 57<sup>TH</sup> STREET SE  
CHARLESTON, WV 25304  
(304) 926-0499 EXT 1846  
[beth.a.ward@wv.gov](mailto:beth.a.ward@wv.gov)

NON-CONFIDENTIAL





September 22, 2015

Beverly McKeone  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304

073-00012

FILE:	
COMPANY	Pleasant Energy
FACILITY	Waverly
REGION	2
REG.	14-0034

Re: Electronic Copies of Pleasants Energy PSD Air Permit Application for Simple-Cycle Combustion Turbines

Dear Ms. McKeone:

Enclosed please find two electronic copies of the Pleasants Energy PSD Air Permit Application for Simple-Cycle Combustion Turbines. The application modeling files are also included on the enclosed CDs. These electronic copies include the required responsible official signatures.

As per our discussion with Steve Pursley, no additional modeling CDs are required since two modeling CDs were submitted with the hard copies along with the four CDs containing both the application package and modeling files.

The Class I Legal Advertisement with the corrected regulation (45CSR14 instead of 45CSR13) will be published in the local paper on Saturday, September 26<sup>th</sup> and the legal affidavit will be available to submit to the WVDEP on Wednesday, September 30<sup>th</sup>.

As WV DEP proceeds with the evaluation process, please do not hesitate to contact me if questions arise. Thank you for your time and efforts on our Project.

Sincerely,

Mary Hauner-Davis  
Burns & McDonnell  
mhauner@burnsmcd.com  
Phone: 816-822-4252



Enclosure

cc: Bruce Birbeck, GDF Suez  
Gerald Gatti, GDF Suez

NON-CONFIDENTIAL

**Pursley, Steven R**

---

**From:** Adkins, Sandra K  
**Sent:** Monday, September 21, 2015 3:54 PM  
**To:** gerald.gatti@gdfsuezna.com; adam.birbeck@gdfsuezna.com; mhauner@burnsmcd.com  
**Cc:** McKeone, Beverly D; Pursley, Steven R  
**Subject:** WV DAQ Permit Application Status for Pleasants Energy, LLC; Waverly

**Categories:** Red Category

**RE: Application Status  
Pleasants Energy, LLC  
Waverly  
Plant ID No. 073-00022  
Application No. R14-0034**

Mr. Gatti,

Your application for a construction permit for the Waverly facility was received by this Division on September 18, 2015, and was assigned to Steve Pursley. The following items were not included in the initial application submittal:

**Original affidavit for Class I legal advertisement not submitted.**

*\*Please note to use phone extension 1250 for legal ads. Must republish ad – application is for a 45CSR14 Prevention of Significant Deterioration major source construction permit, not a Rule 13 permit.*

**Original and two electronic copies of the application not submitted. Electronic versions must include signatures.**

*\*Need 4 additional CD's of the modeling files*

*These items are necessary for the assigned permit writer to continue the 30-day completeness review.*

Within 30 days, you should receive a letter from Steve stating the status of the permit application and, if complete, given an estimated time frame for the agency's final action on the permit.

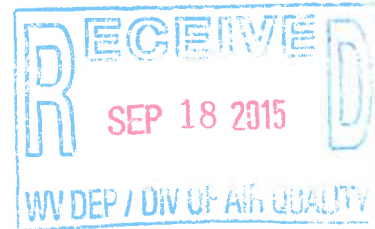
Any determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit decision.

Should you have any questions, please contact the assigned engineer, Steve Pursley, at 304-926-0499, extension 1218.

NON-CONFIDENTIAL

September 17, 2015

Beverly McKeone  
West Virginia Department of Environmental Protection  
Division of Air Quality  
601 57th Street, SE  
Charleston, WV 25304



Re: PSD Air Permit Application for Simple-Cycle Combustion Turbines at Pleasants Energy Facility

Dear Ms. McKeone:

Pleasants Energy, LLC (Pleasants Energy) is submitting this Prevention of Significant Deterioration Air Permit Application for increased hours of operation of the simple-cycle combustion turbines at the Pleasants Energy facility, located near Waverly, West Virginia. The Pleasants Energy facility is a 300-megawatt simple-cycle electric generating station that currently operates under Title V permit number R30-07300022-2014. This project will increase the annual operation on natural gas and fuel oil with a combined fuel limit of 19,081,721,569 standard cubic feet per year (SCF/yr), where every gallon of fuel oil combusted is equal to 889 SCF.

The PSD permit application submitted today includes the following:

- Executive Summary
- Introduction
- Project Description
- Emissions Estimates
- Regulatory Review
- Best Available Control Technology (BACT) Analysis
- Air Dispersion Modeling
- Additional Impact Analysis
  - Appendices (including the required West Virginia Department of Environmental Protection (WV DEP) application forms and other necessary information and calculations)

073-00022

FILE:	
COMPANY	Pleasants Energy
FACILITY	Waverly
REGION	2
REG.	14-0034

An application fee of \$11,000 is attached to this letter, along with two signed original hard copies of the air permit application. As requested, four copies of the PDF of the application is also being submitted with the hard copies of the application.

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As WV DEP proceeds with the evaluation process, please contact the following persons with questions or for additional information:

Bruce Birbeck  
GDF Suez North America  
1990 Post Oak Blvd, Suite 1900  
Houston, TX 77056  
Phone: 713-636-1133  
Adam.Birbeck@gdfsuezna.com

Mary Hauner-Davis  
Burns & McDonnell  
9400 Ward Parkway  
Kansas City, MO 64114  
Phone: 816-822-4252  
mhauner@burnsmcd.com

If we can be of any assistance to facilitate your staff's efforts, please do not hesitate to contact me or either of the two contacts listed above. Thank you for your time and efforts on our Project.

Sincerely,



Gerald M. Gatti  
Plant Manager  
Pleasants Energy, LLC  
10319 South Pleasants Highway  
St. Marys, WV 26170  
Direct 304-665-4201  
Fax 304-665-4218  
gerald.gatti@gdfsuezna.com

#### Attachments

cc: Don Stacey, GDF Suez  
Bruce Birbeck, GDF Suez  
Mary Hauner-Davis, Burns & McDonnell

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